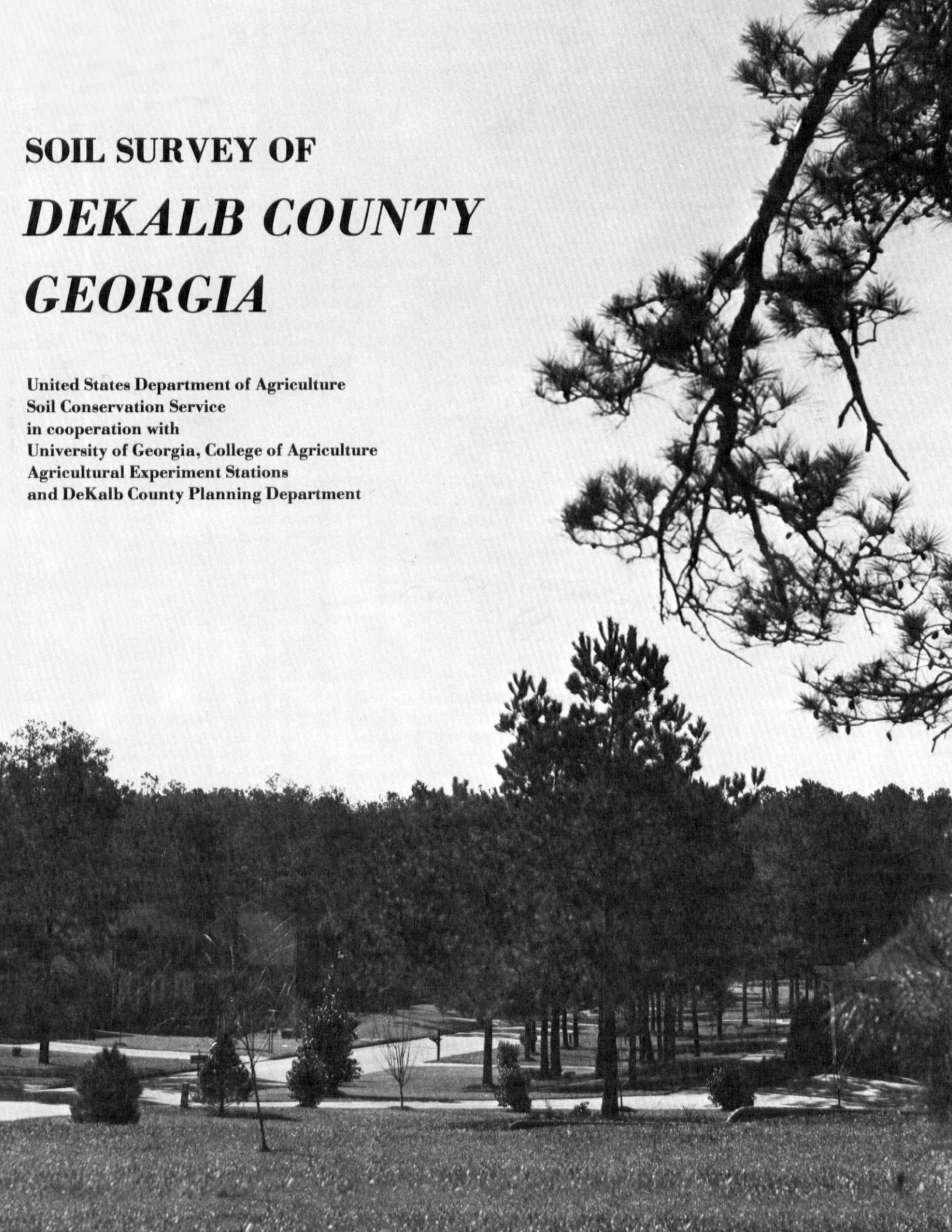
SOIL SURVEY OF

DEKALB COUNTY

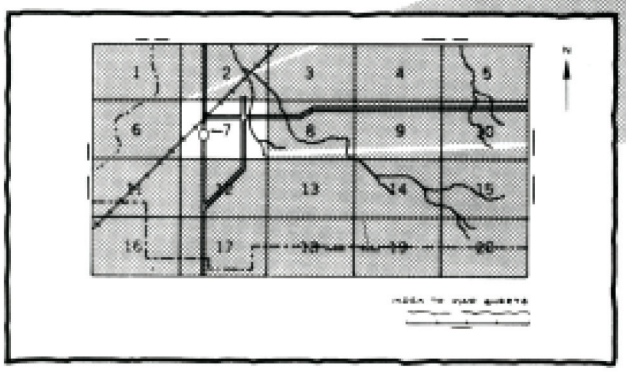
GEORGIA

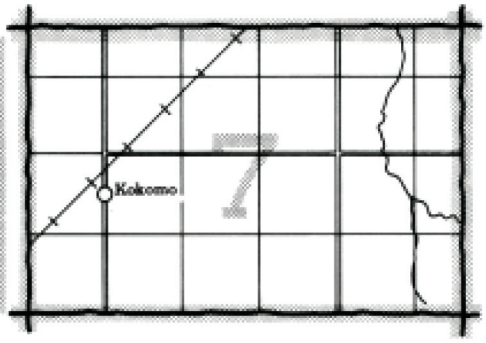
United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Georgia, College of Agriculture
Agricultural Experiment Stations
and DeKalb County Planning Department



HOW TO USE

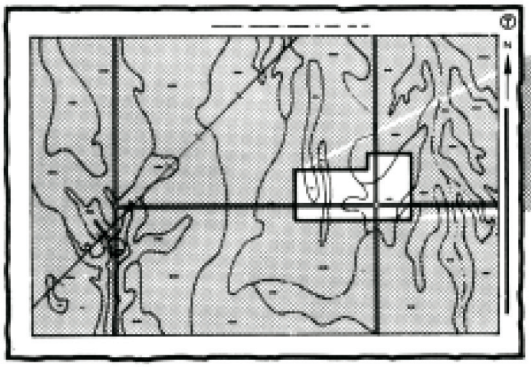
1. Locate your area of interest on the "Index to Map Sheets"

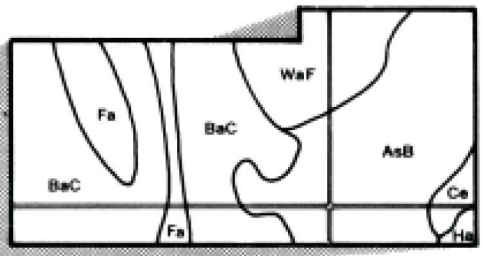




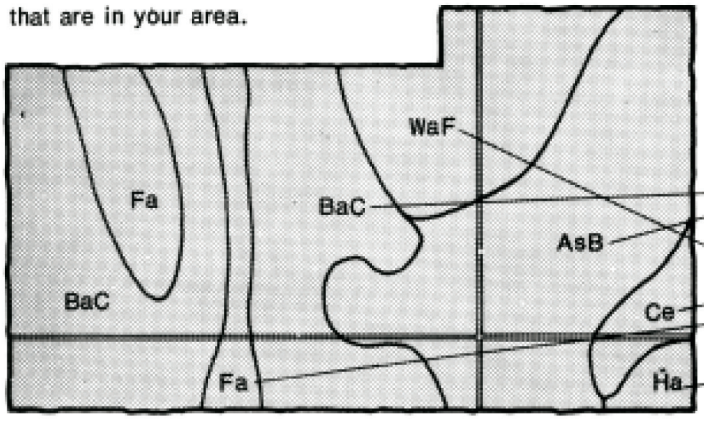
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.



Symbols

AsB
BaC
Ce
Fa
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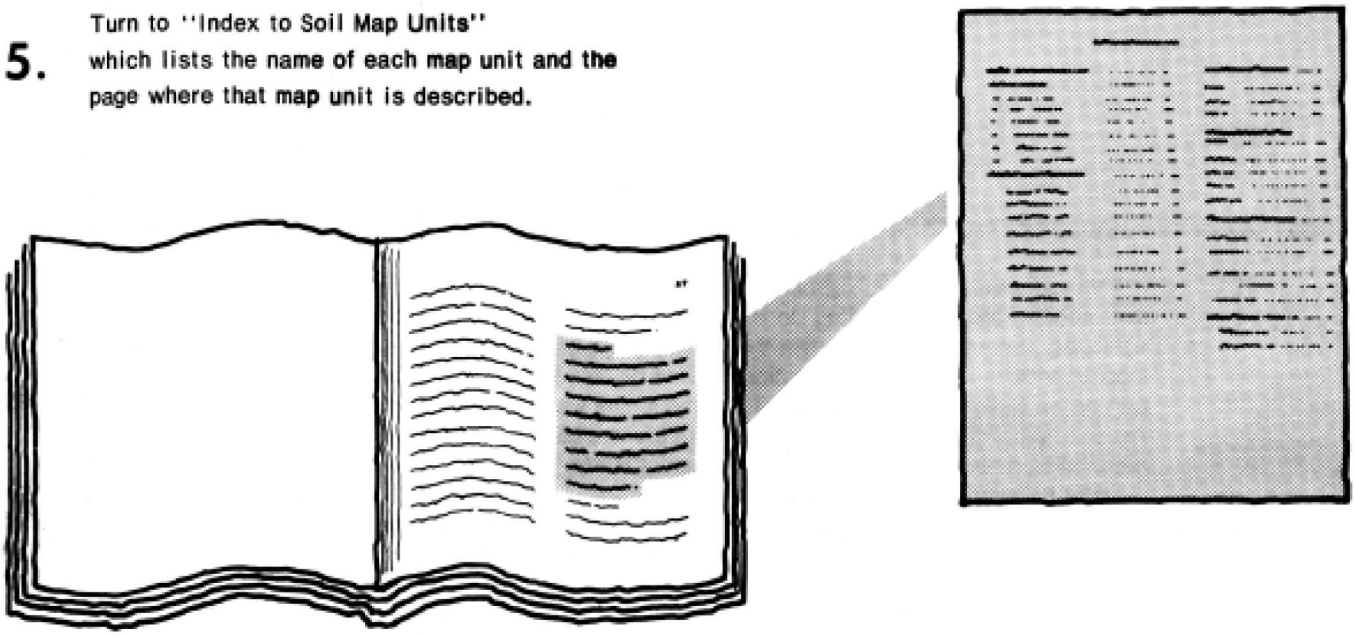
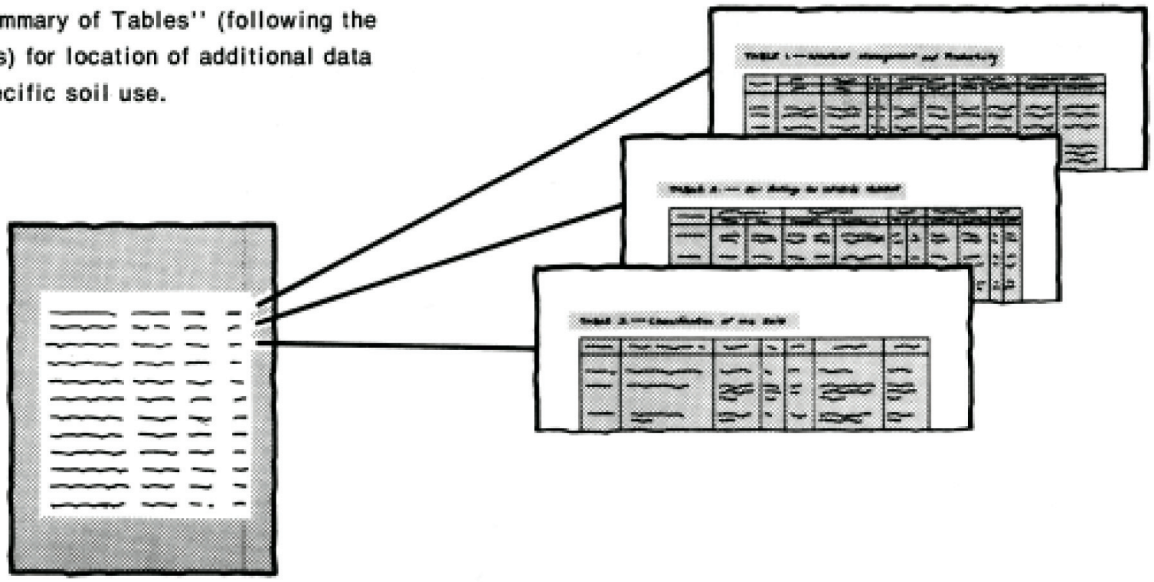
WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1973-77. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979. This survey was made cooperatively by the Soil Conservation Service and the University of Georgia, College of Agriculture, Agricultural Experiment Stations, and the DeKalb County Planning Department. It is part of the technical assistance furnished to the DeKalb County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Typical use of land in DeKalb County. This subdivision is in an area of Cecil-Urban land complex, 2 to 10 percent slopes. This unit is well suited to most urban uses.

contents

soil series

Issued July 1982

index to map units

summary of tables

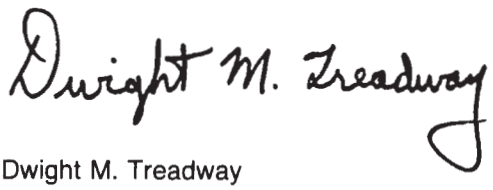
foreword

This soil survey contains information that can be used in land-planning programs in DeKalb County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

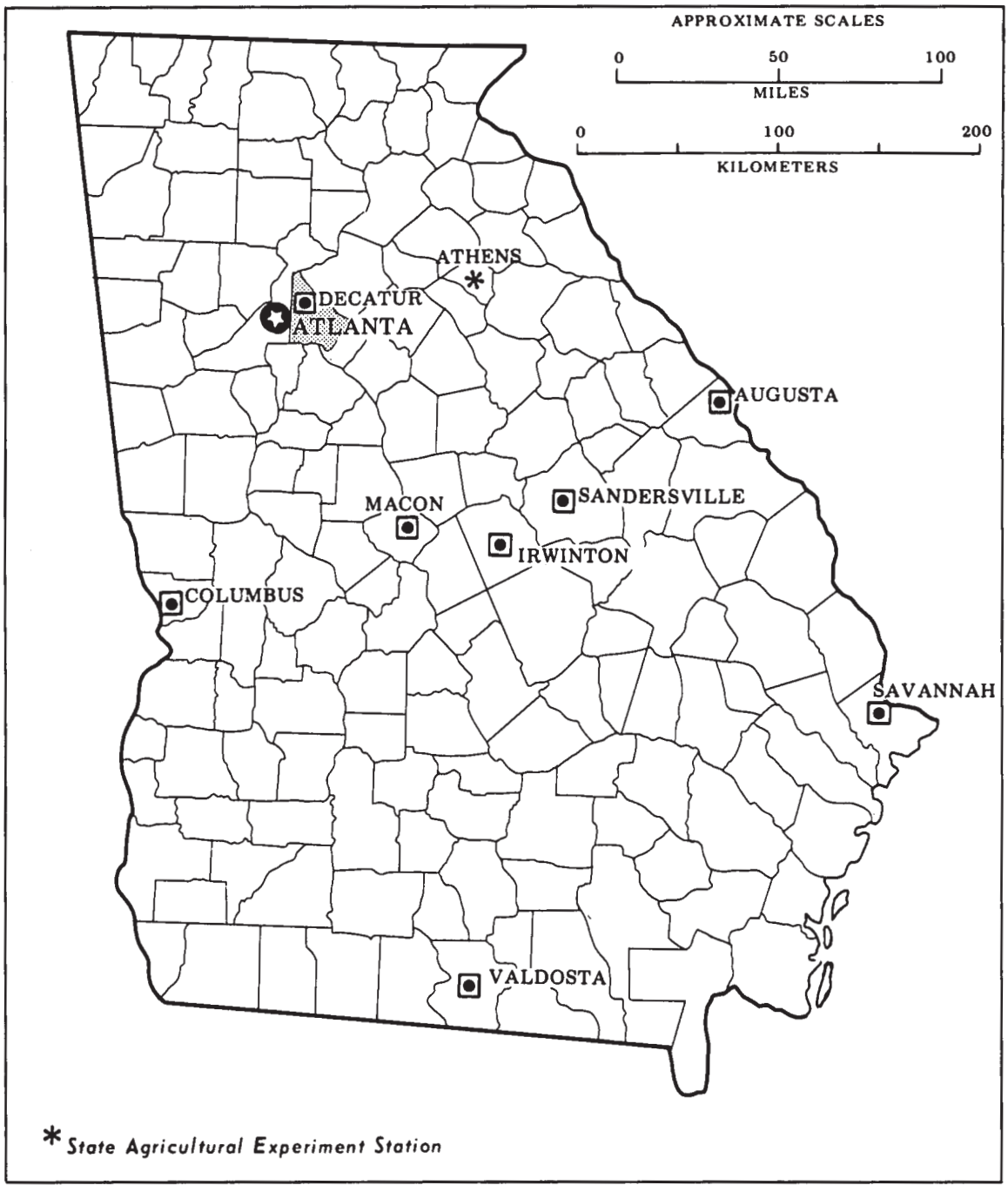
This soil survey is designed for many different users. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Dwight M. Treadway
State Conservationist
Soil Conservation Service



Location of DeKalb County in Georgia.

soil survey of
DeKalb County, Georgia

By Grover J. Thomas, Jr., Soil Conservation Service

Fieldwork by Grover J. Thomas, Jr. and Marion M. Blevins,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
DeKalb County Planning Department and the
University of Georgia, College of Agriculture, Agricultural Experiment Stations

DEKALB COUNTY is in the northwestern part of Georgia. It has a land area of 268.7 square miles or 171,968 acres. DeKalb County is about 22 miles north and south and 18 miles east and west. Decatur, the county seat, is in the western part of the county adjacent to the city of Atlanta.

DeKalb County is in the Southern Piedmont major land resource area. The soils on uplands are mainly well drained and have a loamy surface layer and a clayey subsoil. The landscape is made up of very gently sloping and gently sloping soils on ridgetops and sloping to steep soils on hillsides. The nearly level soils on flood plains are poorly drained to well drained and loamy throughout.

The first soil survey of DeKalb County was published in 1914 (*4*). This survey updates the first survey and provides additional information.

general nature of the county

General information concerning the county is given in this section. It discusses climate; settlement and history; and physiography, relief, and drainage.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Summer in DeKalb County is long and hot. Moist tropical air from the Gulf of Mexico persistently covers the area. Winter is cool and fairly short. Cold waves are rare, and they moderate in 1 to 2 days. Precipitation is fairly heavy throughout the year, and prolonged drought is rare. Precipitation in summer is mainly from thundershowers in afternoon. The precipitation is adequate for all crops commonly grown in the county.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Atlanta, Georgia, in the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44° F, and the average daily minimum temperature is 35°. The lowest temperature on record, which occurred at Atlanta on January 30, 1966, -3°. In summer the average temperature is 77°, and the average daily maximum temperature is 87°. The highest recorded temperature, which occurred on August 16, 1954, is 102°.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature, 50°. The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 48 inches. Of this, 23 inches, or 48 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day

rainfall during the period of record was 5.30 inches at Atlanta on September 25, 1956. Thunderstorms occur on about 50 days each year, and most occur in summer.

Average seasonal snowfall is 2 inches. The greatest snow depth at any one time during the period of record was 3 inches. On the average, 1 day has at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 60 in summer and 50 in winter. The prevailing wind is from the northwest. Average windspeed is highest, 11 miles per hour, in February.

settlement and history

DeKalb County was organized in 1822 from territory in Henry, Fayette, and Gwinnett Counties. It was named in honor of Baron Johann DeKalb, a native German who aided the Colonies. The city of Decatur, named in honor of Stephen Decatur, an American naval officer, was founded in 1823.

Most of the early settlers came from other parts of Georgia and from the Carolinas and Virginia. Many were attracted by offers of land by lottery. These settlers cleared most of the soils on ridgetops and some on the hillsides for cultivated crops. Important crops were cotton, corn, and small grain, and many truck crops. Most farmers raised livestock for their own needs. In addition, dairying was an important source of income.

In 1924, DeKalb County had a population of 3,569. By 1970, its population had grown to 415,387, and Decatur had a population of 21,943.

Since about 1950, farming has steadily declined. Most of the soils formerly cultivated have reverted to woodland or have been developed for urban use. In 1969, DeKalb County had 115 farms, each averaging 78 acres. In 1974, the number of farms was 98 and the average size was 71 acres. The proportion of farmland dropped from 5 percent to 4 percent between 1969 and 1974. In 1979, about 57 percent of DeKalb County was urban or committed to urban use, 35 percent was woodland, 5 percent was idle, and only 3 percent was farmland.

physiography, relief, and drainage

DeKalb County is in the Southern Piedmont major land resource area. The survey area consists mostly of very gently sloping and gently sloping soils on broad to narrow ridgetops and sloping to steep soils on long to short hillsides adjacent to numerous small drainageways that dissect the area. The ridgetops commonly are smooth and convex, and the hilsides commonly are irregular. Nearly level soils are on flood plains along South River, Yellow River, Peachtree Creek, Nancy Creek, and their tributaries. In most places, the flood plains are narrow, and during winter and spring they are frequently flooded.

Elevation ranges from 1,683 feet at the top of Stone Mountain to 640 feet in the southeastern part of the county where South River leaves the county. Several high ridges in DeKalb County are 1,050 feet or more.

South River and its tributaries drain most of the southern part of the county. This river enters the southwestern part of the county, flows generally toward the southeast, and leaves the county at the extreme southeastern corner. Important tributaries of South River are Pole Bridge, Snapfinger, Shoal, and Entrenchment Creeks. Yellow River and its tributaries drain the southeastern part of DeKalb County. This river enters the extreme eastern part of the county and flows generally toward the south. Important tributaries of Yellow River are Stone Mountain, Swift, and Crooked Creeks. Peachtree Creek and Nancy Creek enter the northeastern part of the county on the northwest side. These creeks and their small tributaries are throughout the county and form a well defined trellis pattern.

The soils on uplands are mainly well drained. The bottom lands along the rivers and creeks and their tributaries are subject to frequent flooding during winter and spring. They drain slowly and remain wet for long periods.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for

engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary in suitability for major land uses. A soil is well suited if it has properties that are favorable. A soil is moderately suited if it has properties that require special planning and management to obtain satisfactory performance. A soil is poorly suited if it has properties that are unfavorable.

Each map unit is discussed for its suitability to urban uses, to recreation uses, as a source of topsoil, and as a source of cover for sanitary landfills. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

nearly level soils on flood plains of the Southern Piedmont

These soils are loamy and poorly drained to well drained. They are on flood plains. These soils are brownish throughout, or they have a brownish surface layer and brownish mottled or grayish mottled underlying layers. One map unit is in this group.

1. Cartecay-Toccoa-Wehadkee

Deep, somewhat poorly drained, well drained, and poorly drained soils that predominantly are loamy throughout

Areas of these nearly level soils are throughout the county on narrow to moderately wide flood plains. The relief ranges from low lying, poorly drained areas to areas that are somewhat higher and better drained. Most areas are subject to flooding throughout the year, but frequent, brief periods of flooding occur mainly in winter and spring. Slope commonly is less than 2 percent.

This map unit makes up about 8 percent of the county. It is about 47 percent Cartecay soils, 41 percent Toccoa soils, 5 percent Wehadkee soils, and 7 percent soils of minor extent.

Cartecay soils are somewhat poorly drained. Typically, the surface layer is dark brown silt loam about 8 inches thick. The underlying layers to a depth of 40 inches are dark brown, brown, and pale brown sandy loam and loam that have brown and gray mottles. Below that to a depth of 60 inches or more the strata are light gray sandy loam and sandy clay loam that are mottled yellowish red and yellowish brown.

Toccoa soils are well drained. Typically, the surface layer is sandy loam about 12 inches thick. The upper part of the surface layer is dark brown, and the lower part is reddish brown. The underlying layers to a depth of 34 inches are reddish brown sandy loam. Below that to a depth of 62 inches or more is dark brown sandy loam.

Wehadkee soils are poorly drained. Typically, the surface layer is silt loam about 8 inches thick. The subsoil extends to a depth of 43 inches. It is dark gray silty clay loam that has strong brown and yellowish brown mottles. The underlying material to a depth of 62 inches or more is gray loam that has yellowish brown mottles.

Soils of minor extent in this unit are Altavista and Worsham. The Altavista soils are moderately well drained and commonly are on higher lying stream terraces. The Worsham soils are poorly drained and are at the upper end of drainageways and at the base of hillsides.

These Cartecay-Toccoa-Wehadkee soils are mostly wooded. A few areas are used for cultivated crops and pasture, and some have been developed for urban use.

This unit is poorly suited to urban and recreation uses because of wetness and flooding. These limitations are major concerns for use and management of this unit. Most soils in this unit have good suitability as a source of topsoil and as cover for sanitary landfill. However, the soils in the low lying, poorly drained areas are not as well suited because of wetness.

very gently sloping and gently sloping soils on ridgetops on uplands of the Southern Piedmont

These soils are excessively drained to somewhat poorly drained and are on ridgetops. They have a brownish, loamy surface layer and a loamy or clayey subsoil that is reddish or brownish. In a few places, hard rock is at a depth of less than 40 inches. Three map units are in this group.

2. Iredell-Wilkes-Pacolet

Deep and moderately deep, somewhat poorly drained to well drained soils that have a loamy surface layer and a predominantly clayey subsoil

Areas of these very gently sloping and gently sloping soils are on narrow ridgetops and in lower lying depressions. Slope ranges from 2 to 10 percent.

This map unit is in the southwestern part of the county and makes up about 1 percent of the county. It is about 33 percent Iredell soils, 31 percent Wilkes soils, 24 percent Pacolet soils, and 12 percent soils of minor extent.

Iredell soils are deep and moderately well drained or somewhat poorly drained. Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer is light brownish gray fine sandy loam to a depth of 10 inches. The subsoil extends to a depth of 27 inches. The upper part of the subsoil is light olive brown sandy clay loam, and the lower part dominantly is light olive brown clay. The underlying material to a depth of 44 inches is mottled, weathered rock that crushes to sandy loam. Below that to a depth of 65 inches or more is soft bedrock.

Wilkes soils are moderately deep and well drained. Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. The yellowish brown subsoil is 16 inches thick. The upper part is sandy loam, and the lower part is sandy clay loam. The underlying material to a depth of 28 inches is weathered rock. Below that to a depth of 40 inches is soft bedrock. Hard rock is at a depth of 40 inches or more.

Pacolet soils are deep and well drained. Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsoil is predominantly red and extends to a depth of 36 inches. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 66 inches or more is weathered rock.

Soils of minor extent in this unit are Cecil, Madison, and Gwinnett. These well drained soils are on ridgetops with the major soils.

Most areas of this unit are wooded. A few areas are in pasture and urban use. Erosion and sedimentation are management concerns if the plant cover is removed.

Most of the Iredell-Wilkes-Pacolet soils are poorly suited to urban uses, mainly because of wetness or depth to rock. These need to be considered before installing sanitary facilities or developing building sites. Some soils in parts of each unit, however, are well suited to urban use and can be expected to perform well.

Most of these soils are well suited to recreation use but wetness limits use in a part of each unit. Most soils in this unit have poor suitability as a source of topsoil and as cover for sanitary landfills. The surface layer is thin and clayey, and the area is difficult to reclaim.

3. Pacolet-Wedowee-Ashlar

Deep and moderately deep, well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

Areas of these very gently sloping and gently sloping soils are on ridgetops. Slope ranges from 2 to 10 percent.

This map unit is mainly in the eastern part of the county and makes up about 9 percent of the county. It is about 47 percent Pacolet soils, 28 percent Wedowee soils, 16 percent Ashlar soils, and 9 percent soils of minor extent.

Pacolet soils are deep and well drained. Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsoil is predominantly red and extends to a depth of 36 inches. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 66 inches or more is weathered rock.

Wedowee soils are deep and well drained. Typically, the surface layer is yellowish brown sandy loam about 5 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 10 inches. The subsoil extends to a depth of 35 inches. It is predominantly yellowish red and mottled red and brown. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 64 inches or more is weathered rock.

Ashlar soils are moderately deep and well drained to excessively drained. Typically, the surface layer is dark yellowish brown sandy loam about 8 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 24 inches. The underlying material to a depth of 31 inches is weathered rock. Hard rock is at a depth of 31 inches.

Soils of minor extent in this unit are Altavista and Appling. The Altavista soils are moderately well drained and are on stream terraces. The well drained Appling soils are on the same ridgetops as the major soils.

This unit is mostly wooded. A few areas are in pasture and urban use. Erosion and sedimentation are concerns if the plant cover is removed.

Most areas of these Pacolet-Wedowee-Ashlar soils are well suited to many urban and recreation uses. In places, however, hard rock is at a depth of 2 to 3 feet and limits urban use. In areas that are eroded, the surface layer is clayey. This must be considered if these areas are to be

used for recreation and urban developments. Most soils in this unit have only fair suitability as a source of cover for sanitary landfills because of the clayey subsoil. Also, most of the soils are a poor source of topsoil because of the thin surface layer.

4. Gwinnett-Cecil-Madison

Deep, well drained soils that have a loamy surface layer and a clayey subsoil

Areas of these very gently sloping and gently sloping soils are on ridgetops. Slope ranges from 2 to 10 percent.

This map unit is mainly in the central and eastern part of the county and makes up about 11 percent of the county. It is about 31 percent Gwinnett soils, 27 percent Cecil soils, 25 percent Madison soils, and 17 percent soils of minor extent.

Typically, Gwinnett soils have a dark reddish brown sandy loam surface layer about 4 inches thick. The subsoil is dark red clay to a depth of about 30 inches. The underlying material to a depth of 61 inches or more is yellowish brown, strong brown, yellowish red, and dark red weathered rock.

Typically, Cecil soils have a brown sandy loam surface layer about 6 inches thick. The subsoil is predominantly red to a depth of 51 inches. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. Yellowish brown mottles are in the middle and lower parts. The underlying soil material to a depth of 62 inches or more is red.

Typically, Madison soils have a dark brown sandy loam surface layer about 6 inches thick. The subsoil extends to a depth of 28 inches. It is red and contains many flakes of mica. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is clay loam. The underlying material to a depth of 62 inches is weathered rock that crushes to sandy loam.

Soils of minor extent in this unit are Appling, Hiwassee, and Pacolet. These soils are on the same ridgetops as the major soils.

Most areas of these Gwinnett-Cecil-Madison soils are wooded. A few areas are in urban use. Erosion and sedimentation are management concerns if the plant cover is removed.

The very gently sloping soils in this unit are well suited to most urban and recreation uses; the gently sloping soils are less well suited because of slope. In areas that are eroded, the surface layer is clayey. This must be considered if the land is to be developed for recreation or urban uses. These soils have only fair suitability as a source of cover for sanitary landfills, mainly because of the clayey subsoil. Also, the soils are a poor source of topsoil because of the thin surface layer.

predominantly sloping to steep soils on hillsides on uplands of the Southern Piedmont

These soils are excessively drained to well drained and are on hillsides. They have a brownish, loamy surface layer that is stony in places and a predominantly clayey subsoil that is reddish or brownish. Hard rock is at a depth of less than 40 inches in several areas. Four map units are in this group.

5. Wilkes-Chestatee

Deep and moderately deep, well drained soils that have a loamy, commonly stony surface layer and a loamy or clayey subsoil

Areas of these predominantly sloping to steep soils are on short hillsides. Slope ranges from 6 to 45 percent.

This map unit is in the southwestern part of the county and makes up about 2 percent of the county. It is about 41 percent Wilkes soils, 40 percent Chestatee soils, and 19 percent soils of minor extent.

Wilkes soils are moderately deep. Typically, the surface layer is very dark grayish brown stony sandy loam about 6 inches thick. The subsurface layer is light olive brown gravelly sandy loam about 5 inches thick. The subsoil extends to a depth of 19 inches. It is yellowish brown clay that has a few yellowish red mottles. The underlying material to a depth of 48 inches is olive yellow, yellowish red, and strong brown weathered rock that crushes to loam. Below that to a depth of 60 inches or more is olive, brownish yellow, gray, and greenish gray soft bedrock that crushes to sandy loam.

Chestatee soils are deep. Typically, the surface layer is dark grayish brown stony sandy loam about 5 inches thick. The subsoil extends to a depth of 35 inches. The upper few inches is yellowish red stony clay loam and has about 15 percent, by volume, pebbles, cobbles, and stone. The lower part of the subsoil is stony red clay and has 25 to 35 percent, by volume, pebbles, cobbles, and stones. The underlying material to a depth of 62 inches or more is reddish yellow, strong brown, and yellowish red weathered rock that has a few pockets filled with red clay loam.

Soils of minor extent in this unit are Gwinnett, Musella, and Pacolet. These soils are on the same hillsides as the major soils.

Most areas of these Wilkes-Chestatee soils are wooded. A few areas are in urban use and pasture. Erosion and sedimentation are management concerns if the plant cover is removed.

The strongly sloping and steep soils in this map unit are poorly suited to most urban and recreation uses because of slope. The gently sloping and sloping soils are better suited to recreation and some urban uses. If community development is planned for areas of these soils, depth to bedrock and stoniness, in addition to

slope, need to be considered in development. Most soils in this unit have poor suitability as a source of topsoil and as cover for sanitary landfills because of slope, stoniness, and the difficulty of reclaiming the area.

6. Ashlar-Pacolet-Wedowee

Deep and moderately deep, well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

Areas of these sloping to steep soils are on hillsides that are mostly smooth or irregular and choppy. Slope ranges from 10 to 30 percent.

This map unit is in the eastern part of the county and makes up about 5 percent of the county. It is about 41 percent Ashlar soils, 28 percent Pacolet soils, 26 percent Wedowee soils, and 5 percent soils of minor extent.

Ashlar soils are moderately deep and well drained to excessively drained. Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 15 inches. The subsoil is yellowish brown sandy loam and extends to a depth of 24 inches. The underlying material to a depth of 38 inches is weathered rock that is brown, white, and strong brown and has thin dark brown clay lenses. Hard rock is at a depth of 38 inches.

Pacolet soils are deep and well drained. Typically, the surface layer is brown sandy loam about 4 inches thick. The subsurface layer is brown sandy loam to a depth of 8 inches. The subsoil is predominantly red and extends to a depth of 38 inches. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam that has a few yellowish brown and strong brown mottles. The underlying material to a depth of 60 inches or more is red and yellowish red weathered rock that crushes to sandy loam.

Wedowee soils are deep and well drained. Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The subsurface layer is brownish yellow sandy loam to a depth of 10 inches. The subsoil is predominantly strong brown, has red mottles, and extends to a depth of 33 inches. The upper part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 60 inches or more is weathered rock. It is strong brown, yellowish red, and yellowish brown and has thin lenses of yellowish red clay in seams and cracks. This material crushes easily to sandy loam.

The soils of minor extent in this unit are Gwinnett and Chestatee. These well drained soils are on the same hillsides as the major soils.

Most areas of these Ashlar-Pacolet-Wedowee soils are wooded. A few areas are in urban use. Erosion and sedimentation are management concerns if the plant cover is removed.

The strongly sloping and steep soils in this unit are poorly suited to most urban and recreation uses because of slope. The sloping soils are better suited to recreation and some urban uses. If community development is planned for this unit, both depth to bedrock and slope need to be considered. Soils in this unit have poor suitability as a source of topsoil and as cover for sanitary landfills. In addition to slope, the surface layer is thin, and the area is difficult to reclaim.

7. Madison-Pacolet-Gwinnett

Deep, well drained soils that have a loamy surface layer and a clayey subsoil

Areas of these sloping to steep soils are on hillsides that are mostly smooth or irregular and choppy. Slope ranges from 10 to 30 percent.

This map unit is in areas throughout the county and makes up about 8 percent of the county. It is about 35 percent Madison soils, 34 percent Pacolet soils, 17 percent Gwinnett soils, and 14 percent soils of minor extent.

Typically, Madison soils have a very dark grayish brown sandy loam surface layer about 5 inches thick. The subsurface layer is dark brown sandy loam to a depth of 9 inches. The subsoil extends to a depth of 32 inches. It is red and contains many flakes of mica. The upper few inches are sandy clay loam, the middle part is clay, and the lower part is clay loam. The underlying material to a depth of 62 inches or more is gray, dark brown, and olive weathered rock.

Typically, Pacolet soils have a brown sandy loam surface layer about 4 inches thick. The subsurface layer is brown sandy loam to a depth of 8 inches. The subsoil is predominantly red and extends to a depth of 38 inches. The upper few inches of the subsoil is sandy clay loam; the middle part is clay; and the lower part is sandy clay loam that has a few yellowish brown and strong brown mottles. The underlying material to a depth of 60 inches or more is red and yellowish red weathered rock that crushes to sandy loam.

Typically, Gwinnett soils have a surface layer of dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red clay and extends to a depth of 29 inches. The underlying material to a depth of 62 inches or more is dark red, weak red, and yellowish brown weathered rock that crushes to sandy loam.

The soils of minor extent in this unit are Cecil, Sweetapple, and Musella. These somewhat excessively drained to well drained soils are on the same hillsides as the major soils.

Most areas of these Madison-Pacolet-Gwinnett soils are wooded. A few areas are in pasture and urban use. Erosion and sedimentation are management concerns if the plant cover is removed.

The strongly sloping and steep soils in this unit are poorly suited to most urban and recreation uses because of slope. The sloping soils are better suited to community development. In areas that are eroded, the surface layer is clayey. This must be considered if the land is to be developed for recreation or urban uses.

Most soils in this unit are a poor source of topsoil and cover for sanitary landfills mainly because of slope. The sloping soils are, however, a fair source of cover for landfills.

8. Pacolet-Ashlar-Gwinnett

Deep and moderately deep, well drained to excessively drained soils that have a loamy surface layer, which is very rocky in places, and a loamy or clayey subsoil

Areas of these sloping to steep soils are on hillsides. Slope ranges from 6 to 45 percent.

This map unit is mainly in the eastern part of the county and makes up about 5 percent of the county. It is about 46 percent Pacolet soils, 22 percent Ashlar soils, 20 percent Gwinnett soils, and 12 percent soils of minor extent.

Pacolet soils are deep and well drained. Typically, the surface layer is brown sandy loam about 4 inches thick. The subsurface layer is brown sandy loam to a depth of 8 inches. The subsoil is predominantly red and extends to a depth of 38 inches. The upper few inches are sandy clay loam, the middle part is clay, and the lower part is sandy clay loam that has a few yellowish brown and strong brown mottles. The underlying material to a depth of 60 inches or more is red and yellowish red weathered rock that crushes to sandy loam.

Ashlar soils are moderately deep and well drained or excessively drained. Typically, about 5 percent of the surface is covered with stones, boulders, and outcrops of rock. The surface layer is dark brown sandy loam about 4 inches thick. The subsurface layer is light yellowish brown sandy loam about 5 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 23 inches. The underlying material to a depth of 31 inches is light yellowish brown soft weathered rock that crushes to coarse sandy loam. Hard rock is at a depth of about 31 inches.

Gwinnett soils are deep and well drained. Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red clay and extends to a depth of 29 inches. The underlying material to a depth of 62 inches or more is dark red, weak red, and yellowish brown weathered rock that crushes to sandy loam.

The soils of minor extent in this unit are Chestatee, Madison, and Musella. These well drained soils are on the same hillsides as the major soils.

Most areas of these Pacolet-Ashlar-Gwinnett soils are wooded. A few areas are in pasture and urban use. Erosion and sedimentation are management concerns if the plant cover is removed.

The strongly sloping and steep soils in this map unit are poorly suited to most urban and recreation uses because of slope. The gently sloping and sloping soils are better suited to most recreation uses and some urban uses. In areas that are eroded, the surface layer is clayey. This must be considered if the land is to be developed for recreation or urban uses. If community development is planned for this unit, depth to bedrock, rockiness, and slope need to be considered. The strongly sloping and steep soils are a poor source of topsoil and cover for sanitary landfills, mainly because of slope. The more gently sloping and sloping soils are, however, a fair source of cover for landfills.

predominantly very gently sloping to strongly sloping soils and Urban land on uplands of the Southern Piedmont

These are well drained soils on ridgetops or hillsides. They have a brownish, loamy surface layer and a reddish, clayey subsoil. These soils are intermingled with Urban land, or areas consist only of Urban land. Urban land areas have been altered by cutting, filling, and shaping, and have been established in residential, community, or industrial use. Three map units are in this group.

9. Cecil-Urban land

Deep, well drained soils that have a loamy surface layer and a clayey subsoil and Urban land that is mainly residential; on ridgetops

Areas of these very gently sloping and gently sloping soils and Urban land are on ridgetops. Slope ranges from 2 to 10 percent.

This map unit is mainly in the western and central parts of the county and makes up about 20 percent of the county. It is about 60 percent Cecil soils, 25 percent Urban land, and 15 percent soils of minor extent.

Typically, Cecil soils have a brown sandy loam surface layer about 6 inches thick. The subsoil extends to a depth of 54 inches. The upper few inches are yellowish red sandy clay loam, the middle part is red clay that has a few yellowish brown mottles, and the lower part is red sandy clay loam that has yellowish brown mottles. To a depth of 62 inches or more is red and yellowish brown rock.

The soils in the Urban land areas have been altered by cutting, filling, shaping, and smoothing. Most Urban land is used as private dwellings, streets, and sidewalks.

The soils of minor extent in this unit are Appling, Pacolet, and Wedowee. These soils are on the same ridgetops as the major soils.

Most areas of this map unit are used for urban development or are committed to urban use. A few areas have been developed for recreation. Areas are well suited to these uses. However, erosion and sedimentation are management concerns if the plant cover is removed.

10. Pacolet-Urban land

Deep, well drained soils that have a loamy surface layer and a clayey subsoil and Urban land that is mainly residential; on hillsides

These sloping and strongly sloping soils and Urban land areas are on hillsides. Slope ranges from 10 to 25 percent.

This map unit is mainly in the western and central parts of the county and makes up about 17 percent of the county. It is about 69 percent Pacolet soils, 21 percent Urban land, and 10 percent soils of minor extent.

Typically, Pacolet soils have a brown sandy loam surface layer about 6 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red sandy clay loam, the middle part is red clay, and the lower part is yellowish red sandy clay loam. The underlying material to a depth of 65 inches or more is red, yellowish red, strong brown, and yellowish brown weathered rock.

The soils in the Urban land areas have been altered by cutting, filling, shaping, and smoothing.

The soils of minor extent in this unit are Madison and Wedowee. These soils are on the same hillsides as the major soils.

Most areas of this map unit are used for urban development or are committed to urban use. A few areas have been developed for recreation. Because of the slope, most soils in this unit are not naturally suited to urban use. However, the Urban land areas have been altered by special design and made suitable for residential development. In areas undergoing preparation for Urban use, erosion and sedimentation are severe hazards.

11. Urban land

Areas that are mainly in community and industrial uses; on ridgetops and hillsides

These very gently sloping to strongly sloping Urban land areas are on ridgetops and hillsides associated with drainageways and flood plains. Slope ranges from 1 to 25 percent.

This unit is mainly in the western and central parts of the county and makes up about 13 percent of the county. It is about 98 percent Urban land and 2 percent Udorthents.

The soils in Urban land areas have been modified by cutting, filling, shaping, and smoothing. Most Urban land areas are in shopping centers, schools, parking lots, industries, motels, housing developments, and airports. A few places are cut areas. Several minor areas are wooded or in grass.

Erosion is a severe hazard in areas under reconstruction. Runoff from the uplands is a hazard in areas on the flood plain.

very gently sloping to steep Rock outcrop and Pits on uplands of the Southern Piedmont

The Rock outcrops and Pits are on ridgetops and hillsides. Rock outcrop is hard granite and gneiss that is naturally exposed. Pits are quarries that expose hard granite and gneiss and weathered rock. One map unit is in this group.

12. Rock outcrop-Pits

Areas of Rock outcrop and Pits; on ridgetops and hillsides

These very gently sloping to steep areas are on ridgetops and hillsides mainly in the eastern part of the county.

This map unit makes up about 1 percent of the county. It is about 79 percent Rock outcrop and 21 percent Pits.

Rock outcrop is hard granite and gneiss that is naturally exposed. Pits are areas of quarries that range to a depth of 75 feet and expose hard granite and gneiss and weathered rock.

This unit is poorly suited to urban use. However, it is a good source of crushed stone, rock dust, and building stone.

broad land use considerations

Deciding which land should be used for urban development is important in DeKalb County. Every year, a considerable amount of land is developed for urban use. In 1979 about 98,000 acres, or 57 percent of the county, was Urban land or land committed to urban use. The general soil map is most helpful for planning the general outlines of urban areas, but it cannot be used for the selection of sites for specific urban structures.

The data about specific soils in this survey can be helpful in planning future land use patterns.

Areas of soils that are so unfavorable as to limit urban development severely are not extensive in the county. However, the Cartecay-Toccoa-Wehadkee map unit has soils on flood plains in which flooding and wetness are severe limitations. Also, urban development is extremely limited in the Rock outcrop-Pits map unit. Of the four predominantly sloping to steep map units in DeKalb County, three map units contain the Ashlar or Wilkes soils that have bedrock a few feet below the surface. This limitation in addition to slope makes urban development very costly. Also, because of slope, urban development on soils in the Madison-Pacolet-Gwinnett map unit is more costly than development on the less sloping map units. In the very gently sloping and gently sloping Iredell-Wilkes-Pacolet map unit, some soils have bedrock a few feet below the surface or have high shrink-swell potential in the subsoil. These limitations increase the cost of urban development.

In large areas of the county, the very gently sloping and gently sloping soils on uplands can be developed for urban uses at a lower cost than can soils that are less well suited. Most areas of these soils are in the Gwinnett-Cecil-Madison map unit. Although the county is planned mainly for urban use, these soils are excellent farmland, and this potential should not be overlooked when broad land uses are considered.

The very gently sloping and gently sloping soils in the county in most places can easily be developed for most recreation uses. However, soils in the Cartecay-Toccoa-Wehadkee map unit are frequently flooded and development is limited. Also, soils in the predominantly sloping to steep map units are limited because of slope.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, depth to a restrictive layer, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Gwinnett sandy loam, 2 to 6 percent slopes, is one of several phases in the Gwinnett series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Ashlar-Wedowee complex, 10 to 25 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the rating for many uses. The Glossary defines many of the terms used in describing the soils.

AkA—Altavista fine sandy loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on low lying stream terraces of the Southern Piedmont. It is occasionally flooded for very brief periods during spring and early in summer. Individual areas range from 3 to 10 acres.

Typically, the surface layer is brown fine sandy loam about 7 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 12 inches. The subsoil to a depth of 34 inches is sandy clay loam. It is yellowish brown and has gray mottles in the middle and lower parts. The underlying material to a depth of 62 inches or more is mottled brown and gray sandy loam and gravelly sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. Although the root zone is deep, a water table commonly is at a depth of 1.5 to 2.5 feet in winter and early in spring and somewhat limits plant growth.

Included with this soil in mapping are a few small areas of Cartecay and Toccoa soils. Small areas of a somewhat poorly drained soil are also included.

This Altavista fine sandy loam is only moderately suited to most recreation development because of wetness and flooding. Flooding and wetness are severe limitations to most urban uses. These limitations commonly can be overcome by drainage and flood control measures.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is good.

AkB—Altavista fine sandy loam, 2 to 6 percent slopes. This deep, moderately well drained, very gently sloping soil is on stream terraces of the Southern Piedmont. Individual areas range from 3 to 10 acres.

Typically, the surface layer is yellowish brown fine sandy loam about 8 inches thick. The subsurface layer is

light yellowish brown sandy loam to a depth of 13 inches. The subsoil is dominantly sandy clay loam to a depth of 53 inches. The upper part is brownish yellow; the middle part is yellowish brown and has red, brown, and gray mottles; and the lower part is mottled yellow, brown, and gray. The underlying material to a depth of 88 inches or more is mottled pale yellow, gravelly sandy loam overlying strongly weathered saprolite.

This soil is low in natural fertility and organic matter content. It is very strongly acid to medium acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. Although the root zone is deep, a water table commonly is at a depth of 1.5 to 2.5 feet in winter and early in spring and limits plant growth.

Included with this soil in mapping are small areas of Appling, Cartecay, Toccoa, and Worsham soils. Also included are small areas of a loamy, somewhat poorly drained soil and areas of soils that have 6 to 10 percent slopes.

This Altavista fine sandy loam is poorly suited to most urban uses and only moderately suited to most recreation uses because of wetness. This limitation commonly can be overcome by drainage.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is good.

AmB—Appling sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 15 acres.

Typically, the surface layer is yellowish brown sandy loam about 7 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 14 inches. The subsoil extends to a depth of 55 inches. The upper few inches is yellowish brown sandy clay loam; the middle part is yellowish brown sandy clay that has yellowish red, red, and brownish yellow mottles; and the lower part is mottled yellowish red, red, and yellowish brown clay loam. The underlying material to a depth of 68 inches or more is red sandy loam that has yellowish red mottles and thin lenses of yellowish brown clay.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of soil that have a loamy sand or sandy clay loam surface layer and small areas of Cecil, Pacolet, and Wedowee soils.

This Appling sandy loam soil is well suited to most urban and recreation uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by special design and careful installation. Erosion is a hazard on construction sites. The erosion can be controlled by establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitablility of this soil as a source of daily cover for sanitary landfills is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

AmC—Appling sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on long narrow ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 15 acres.

Typically, the surface layer is dark grayish brown sandy loam about 6 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 14 inches. The subsoil extends to a depth of 55 inches. The upper few inches is yellowish brown sandy clay loam; the middle part is strong brown sandy clay that has light yellowish brown and yellowish red mottles; and the lower part is mottled yellowish red, strong brown, and light yellowish brown sandy clay loam. The underlying soft weathered rock to a depth of 61 inches or more is strong brown, yellowish red, red, and light yellowish brown. It crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of soils that have a loamy sand or sandy clay loam surface layer and a few intermingled areas of Ashlar, Cecil, Pacolet, and Wedowee soils.

This Appling sandy loam is only moderately suited to most urban and recreational uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfills is only fair because of the slope and clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

AuC—Appling-Urban land complex, 2 to 10 percent slopes. This map unit consists of Appling soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. This deep, well drained, very gently sloping and gently sloping

unit is on ridgetops of the Southern Piedmont. Mapped areas range from 5 to 50 acres.

Appling soils make up about 70 percent of each mapped area. Typically, Appling soils have a yellowish brown sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of 48 inches. The upper few inches is yellowish brown sandy clay loam; the middle part is strong brown clay that has a few red mottles; and the lower part is mottled red, strong brown, and yellowish brown sandy clay loam. The underlying soft weathered rock to a depth of 60 inches or more is red, strong brown, and yellowish brown. It crushes to sandy loam.

Appling soils are low in natural fertility and organic matter content. These soils are strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Urban land makes up about 25 percent of each mapped area. The soils have been altered by cutting, filling, and shaping. Most areas of Urban land are used for private dwellings, streets, and sidewalks.

Included with this unit in mapping are eroded areas of soils that have a sandy clay loam surface layer. Most of these eroded soils are dissected by shallow gullies. Also included are small intermingled areas of Cecil, Pacolet, and Wedowee soils.

This Appling-Urban land complex is well suited to most urban and recreation uses. However, moderate permeability is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

AvD—Ashlar sandy loam, very rocky, 6 to 15 percent slopes. This moderately deep, well drained to excessively drained, gently sloping and sloping soil is on ridgetops and short hillsides on uplands of the Southern Piedmont. Slopes are irregular and convex. Individual areas range from 5 to 50 acreas.

Typically, about 5 percent of the surface is covered with stones, boulders, and outcrops of rock. The surface layer is dark brown sandy loam about 4 inches thick. The subsurface layer is light yellowish brown sandy loam about 5 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 23 inches. The underlying material to a depth of 31 inches is light yellowish brown soft weathered rock that crushes to coarse sandy loam. Hard rock is at a depth of about 31 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderately rapid, and available water capacity is low. Because of stones, boulders, and outcrops of rock on the surface, the soil is difficult to work. Root penetration is limited by the underlying hard rock.

Included with this soil in mapping are small areas of soil that have a sandy clay loam subsoil and small areas of soils that have hard rock slightly below a depth of 40 inches or at a depth of less than 20 inches. Small areas of Appling, Pacolet, and Wedowee soils are also included.

This Ashlar sandy loam is poorly suited to most urban uses because hard rock commonly is at a depth of about 2 to 3 feet. It is only moderately suited to recreation uses because of slope. Low available water capacity limits the growth of plants for gardens, lawns, landscaping, and golf fairways.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is poor because the soil layer is thin and the area is difficult to reclaim.

AvF—Ashlar sandy loam, very rocky, 15 to 45 percent slopes. This moderately deep, well drained to excessively drained, strongly sloping and steep soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 75 acres.

Typically, about 8 percent of the surface is covered with stones, boulders, and outcrops of rock. The surface layer is dark brown sandy loam about 4 inches thick. The subsurface layer is light yellowish brown sandy loam to a depth of 10 inches. The subsoil extends to a depth of 24 inches. It is yellowish brown sandy loam and contains a few pebbles and cobbles. The underlying material to a depth of 30 inches is yellowish brown coarse sandy loam. Soft weathered yellowish brown, dark brown, and brown rock extends to a depth of 38 inches. Hard rock is at a depth of 38 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderately rapid, and available water capacity is low. Because of slope, stones, boulders, and outcrops of rock, this soil is difficult to work. Root penetration is limited by the underlying hard rock.

Included with this soil is mapping are small areas of soil that have a sandy clay loam subsoil and small areas of soils that have hard rock slightly below a depth of 40 inches or at a depth of less than 20 inches. Small areas of Pacolet and Wedowee soils are also included.

This Ashlar sandy loam is poorly suited to urban and recreation uses because of slope. Also, hard rock is at a depth of 2 to 3 feet and limits the installation of sanitary facilities.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is poor because of slope.

AwC—Ashlar-Wedowee complex, 2 to 10 percent slopes. This map unit consists of Ashlar and Wedowee

soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are moderately deep or deep, very gently sloping and gently sloping, and well drained to excessively drained. They are on narrow to broad ridgetops on uplands of the Southern Piedmont. Individual areas range from 10 to 75 acres.

Ashlar sandy loam makes up about 50 percent of each mapped area. Typically, the surface layer is dark yellowish brown sandy loam about 8 inches thick. The subsoil is yellowish brown sandy loam that extends to a depth of 24 inches. The underlying material to a depth of 31 inches is weathered rock. Hard rock is at a depth of 31 inches.

This Ashlar soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in areas that have been limed. Permeability is moderately rapid, and available water capacity is low. Tilth is good. This soil can be worked throughout a wide range of soil moisture. Root penetration is limited by the underlying hard rock.

Wedowee sandy loam makes up about 45 percent of each mapped area. Typically, the surface layer is yellowish brown sandy loam about 5 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 10 inches. The subsoil extends to a depth of 35 inches. The upper part is strong brown sandy clay loam and has yellowish red mottles, the middle part is yellowish red clay, and the lower part is yellowish red sandy clay loam. The subsoil has red and brown mottles in the middle and lower parts. The underlying material to a depth of 64 inches or more is weathered rock.

This Wedowee soil is low in natural fertility and organic matter content. The soil is strongly acid or very strongly acid throughout except the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with these soils in mapping are small areas of Appling and Pacolet soils. Also included are a few intermingled areas of soils that have a sandy clay loam subsoil, a few small areas of soils that have hard rock at a depth of less than 20 inches, and a few outcrops of rock.

This Ashlar-Wedowee complex is only moderately suited to urban use because hard rock is at a depth of 2 to 3 feet in much of the area. It is well suited to recreation uses.

Suitability of these soils as a source of topsoil and daily cover for sanitary landfills is poor because the soil material is thin and the borrow area is difficult to reclaim in many places.

AwE—Ashlar-Wedowee complex, 10 to 25 percent slopes. This map unit consists of the Ashlar and Wedowee soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are moderately deep or deep, sloping and strongly sloping, and well drained to excessively drained. They are on hillsides on uplands of the Southern Piedmont. Individual areas range from 10 to 100 acres.

Ashlar sandy loam makes up about 50 percent of each mapped area. Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. The subsurface layer is light yellowish brown sandy loam that extends to a depth of 15 inches. The subsoil is yellowish brown sandy loam and extends to a depth of 24 inches. The underlying material to a depth of 38 inches is weathered rock that is brown, white, and strong brown and has thin, dark brown clay lenses. Hard rock is at a depth of 38 inches.

This Ashlar soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in areas that have been limed. Permeability is moderately rapid, and available water capacity is low. Tilth is good. This soil can be worked throughout a wide range of soil moisture. Root penetration is limited by the underlying hard rock.

Wedowee sandy loam makes up about 45 percent of each mapped area. Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The subsurface layer is brownish yellow sandy loam that extends to a depth of 10 inches. The subsoil extends to a depth of 33 inches. It is strong brown throughout and has red mottles. The upper part is clay and the lower part is sandy clay loam. The underlying material to a depth of 60 inches or more is weathered rock. It is strong brown, yellowish red, and yellowish brown and has thin lenses of yellowish red clay in seams and cracks. This material crushes easily to sandy loam.

This Wedowee soil is low in natural fertility and organic matter content. The soil is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with these soils in mapping are small areas of Chestatee and Pacolet soils. Also included are a few intermingled areas of soils that have a sandy clay loam subsoil, a few small areas of soil that have hard rock at a depth of less than 20 inches, and a few outcrops of rock.

This Ashlar-Wedowee complex is poorly suited to urban and most recreation uses because of slope. Also, hard rock at a depth of 2 to 3 feet in many places limits the installation of sanitary facilities.

Suitability of these soils as a source of topsoil and daily cover for sanitary landfills is poor because of slope. Also, the soil layer is thin and the borrow area is difficult to reclaim in many places.

Ca—Cartecay silt loam, frequently flooded. This deep, somewhat poorly drained, nearly level soil is on

flood plains within the Southern Piedmont. Slope is 0 to 2 percent. It is frequently flooded for brief periods during winter and early in spring. Individual areas range from 3 to 100 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The underlying layers to a depth of 40 inches are dark brown, brown, and pale brown loam and sandy loam that have brown and gray mottles. Below to a depth of 60 inches or more the strata are light gray sandy loam and sandy clay loam that are mottled yellowish brown and yellowish red.

This soil is slightly acid to strongly acid throughout. However some part of the profile between depths of 8 and 40 inches is medium acid or slightly acid in reaction. Permeability is moderately rapid, and available water capacity is high. Tilth is fair. The root zone is deep, but a water table commonly is at a depth of 0.5 foot to 1.5 feet in winter and spring and somewhat limits plant growth.

Included with this soil in mapping are small areas of Altavista, Toccoa, and Wehadkee soils. Also included are small areas of a soil that has a sandy clay loam subsoil and a few areas of a soil that has weathered rock at a depth of less than 40 inches.

This Cartecay silt loam is poorly suited to recreation uses because of wetness and flooding. Flooding and wetness are severe limitations to most urban uses. These limitations can be overcome by extensive flood control and drainage.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is good.

CeB—Cecil sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 25 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is predominantly red and extends to a depth of 51 inches. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. Yellowish brown mottles are in the middle and lower parts. The underlying soil material to a depth of 62 inches or more is red.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Cecil sandy clay loam that is eroded, a few small areas of a soil that has a gravelly sandy loam surface layer, and small areas of a soil that is loamy throughout. Also included are small areas of Appling, Gwinnett, Madison, and Pacolet soils.

This Cecil sandy loam is well suited to most urban and recreation uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfills is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

CeC—Cecil sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on long, narrow ridgetops on uplands of the Southern Piedmont. Slopes are smooth or choppy. Individual areas range from 5 to 25 acres.

Typically, the surface layer is brown sandy loam about 5 inches thick. The subsoil extends to a depth of 52 inches. The upper part is yellowish red clay loam, the middle part is red clay, and the lower part is red sandy clay loam that has yellowish brown mottles. The underlying soil material to a depth of 62 inches is yellowish brown and red.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Cecil sandy clay loam that are eroded and have a few shallow gullies. Also included are areas of Appling, Gwinnett, Madison, or Pacolet soils.

This Cecil sandy loam is only moderately suited to urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. These limitations commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

CeD—Cecil sandy loam, 10 to 15 percent slopes. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. Slopes are short and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsoil extends to a depth of 44 inches. The upper part is yellowish red sandy clay loam, the middle part is red clay, and the lower part is

red clay loam. The underlying soil material to a depth of 62 inches or more is red, yellowish red, and strong brown.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of a soil that has an eroded sandy clay loam surface layer. Also included are small areas of Gwinnett, Madison, and Pacolet soils.

This Cecil sandy loam is only moderately suited to urban uses and recreational development because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. These limitations commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent plant cover on construction sites and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

CfC2—Cecil sandy clay loam, 2 to 10 percent slopes, eroded. This deep, well drained, very gently sloping to gently sloping soil is on ridgetops on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are choppy and complex. Individual areas range from 5 to 20 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of about 52 inches. The upper part is clay and the lower part is clay loam. The underlying soil material to a depth of 61 inches or more is yellowish red and strong brown.

The soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. The soil can be worked more easily if it is not too wet or too dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are areas of Cecil sandy loam. Also included are small areas of Appling, Gwinnett, Madison, and Pacolet soils.

This Cecil sandy clay loam is well suited to most urban uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This commonly can be overcome by the special design and careful installation of structures. Most recreation uses are only moderately suited because the surface layer is too clayey.

Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

CuC—Cecil-Urban land complex, 2 to 10 percent slopes. This map unit consists of Cecil soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. This deep, well drained, very gently sloping and gently sloping unit is on ridgetops on uplands of the Southern Piedmont. Mapped areas range from 5 to 150 acres.

Cecil soils make up about 70 percent of each mapped area. Typically, Cecil soils have a brown sandy loam surface layer about 6 inches thick. The subsoil extends to a depth of 54 inches. The upper few inches is yellowish red sandy clay loam, the middle part is red clay that has a few yellowish brown mottles, and the lower part is red sandy clay loam that has common yellowish brown mottles. The underlying soil material to a depth of 62 inches or more is red and yellowish brown.

Cecil soils are low in natural fertility and organic matter content. These soils are strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Urban land makes up about 25 percent of each mapped area. The soils have been altered by cutting, filling, and shaping. Most urban land is used for private dwellings, streets, and sidewalks (fig. 1).

Included with this unit in mapping are eroded areas of Cecil sandy clay loam. Most of these areas are dissected by shallow gullies. Also included are small, intermingled areas of Appling, Gwinnett, Madison, and Pacolet soils.

This Cecil-Urban land complex is well suited to most urban and recreation uses. However, moderate permeability in Cecil soils is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard, but it can be controlled by the establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

CvF—Chestatee stony sandy loam, 15 to 45 percent slopes. This deep, well drained, strongly sloping and steep soil is on short hillsides of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 30 acres.

Figure 1.—Urban development in an area of Cecil-Urban land complex, 2 to 10 percent slopes. The soils in this unit are well suited to local roads and streets and most other urban uses.

Typically, the surface layer is dark grayish brown stony sandy loam about 5 inches thick. The subsoil extends to a depth of 35 inches. The upper few inches are yellowish red stony clay loam and have about 15 percent, by volume, pebbles, cobbles, and stones. The lower part is stony red clay and has 25 to 35 percent, by volume, pebbles, cobbles, and stones. The underlying material to a depth of 62 inches or more is reddish yellow, strong brown, and yellowish red weathered rock that has a few pockets filled with red clay loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderate, and available water capacity is medium. Because of slope and stones, this soil is difficult to work (fig. 2). The root zone is deep, however, and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Musella, Pacolet, and Wilkes soils. Also included are a few small areas of soil that are less than 40 inches thick and a few areas of soil that are more than 40 inches thick.

This Chestatee stony sandy loam is poorly suited to urban and recreation uses because of slope.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is poor because of slope. Large stones further limit its suitability for topsoil. Areas have been altered, however, by cutting, smoothing, and shaping so this soil can be used for disposal of refuse (fig. 3).

GeB—Gwinnett sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on broad ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 30 acres.

Typically, the surface layer is dark reddish brown sandy loam about 7 inches thick. The subsoil is dark red clay that extends to a depth of about 31 inches. The underlying material to a depth of 62 inches or more is yellowish brown and black weathered rock that has dark red clay lenses and tongues.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small eroded areas of Gwinnett sandy clay loam and a few

Figure 2.—Sparse hardwoods in an area of Chestatee stony sandy loam, 15 to 45 percent slopes. Because of the stones, this soil is difficult to manage.

intermingled areas of Cecil, Hiwassee, Madison, or Pacolet soils.

This Gwinnett sandy loam is well suited to most urban and recreation uses. Erosion is a hazard on construction sites. This hazard can be controlled by the establishment of permanent ground cover on construction sites and mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

GeC—Gwinnett sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on narrow ridgetops on uplands of the Southern Piedmont. Slopes are irregular and convex. Individual areas range from 5 to 30 acres.

Typically, the surface layer is dark reddish brown sandy loam about 4 inches thick. The subsoil is dark red clay and extends to a depth of 30 inches. The underlying material to a depth of 61 inches or more is yellowish brown, strong brown, yellowish red, and dark red weathered rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett sandy clay loam and a few intermingled areas of Cecil, Hiwassee, Gwinnett, Madison, and Pacolet soils.

This Gwinnett sandy loam is only moderately suited to urban and recreation uses because of slope. This limitation commonly can be overcome by the special

design and installation of structures. Erosion is a hazard on construction sites. This hazard can be controlled by the establishment of permanent ground cover on construction sites and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

GeD—Gwinnett sandy loam, 10 to 15 percent slopes. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red clay and extends to a depth of 29 inches. The underlying material to a depth of 62 inches or more is dark red, weak red, and yellowish brown weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett sandy clay loam and a few intermingled areas of Hiwassee, Madison, and Pacolet soils.

This Gwinnett sandy loam is only moderately suited to most urban and recreation uses because of slope. This limitation can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent plant cover and by

Figure 3.—A sanitary landfill in an area of Chestatee stony sandy loam, 15 to 45 percent slopes. This strongly sloping and steep soil has been altered by cutting, smoothing, and shaping, so it can be used for the disposal of refuse.

mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

GeE—Gwinnett sandy loam, 15 to 30 percent slopes. This deep, well drained, strongly sloping and steep soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 30 acres.

Typically the surface layer is dark reddish brown sandy loam about 7 inches thick. The subsoil is a dark red clay that extends to a depth of 38 inches. The underlying material to a depth of 62 inches or more is weathered yellowish brown and red weathered soil material.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few eroded areas of Gwinnett sandy clay loam and a few intermingled areas of Hiwassee, Madison, and Pacolet soils.

This Gwinnett sandy loam is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfills is poor because of slope. This soil is also a poor source of topsoil because the surface layer is thin.

GwC2—Gwinnett sandy clay loam, 2 to 10 percent slopes, eroded. This deep, well drained, very gently sloping and gently sloping soil is on ridgetops on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas range from 5 to 35 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The subsoil is dark red clay that extends to a depth of 30 inches. The underlying material to a depth of 60 inches or more is yellowish brown, red, and dark red weathered soil material.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. This soil can be worked more easily if it is not too wet or too dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett sandy loam and a few intermingled areas of Hiwassee, Madison, and Pacolet soils.

This Gwinnett sandy clay loam is well suited to most urban uses. It is only moderately suited to most recreation uses because the surface layer is too clayey. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent type cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

GwD2—Gwinnett sandy clay loam, 10 to 15 percent slopes, eroded. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and choppy. Individual areas range from 5 to 25 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 6 inches thick. The subsoil is dark red clay that extends to a depth of 35 inches. The underlying material to a depth of 62 inches or more is reddish brown, yellowish brown, and strong brown weathered soil material that crushes to loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. This soil has poor tilth. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett sandy loam and a few intermingled areas of Madison and Pacolet soils.

This Gwinnett sandy clay loam is only moderately suited to most urban and recreation uses because of slope. Recreation uses are also limited because of clay in the surface layer. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfills is only fair because of a clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

GwE2—Gwinnett sandy clay loam, 15 to 25 percent slopes, eroded. This deep, well drained, strongly sloping soil is on hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and choppy. Individual areas range from 5 to 30 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 4 inches thick. The subsoil is dark

red clay that extends to a depth of 33 inches. The underlying material to a depth of 60 inches or more is red, brownish yellow, and dark red weathered soil material.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett sandy loam and a few intermingled areas of Madison and Pacolet soils.

This Gwinnett sandy clay loam is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of daily cover for sanitary landfill is poor because of slope. This soil is a poor source of topsoil because the surface layer is thin.

HsB—Hiwassee sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on broad ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 15 acres.

Typically, the surface layer is dark reddish brown sandy loam about 7 inches thick. The subsoil is dark red and extends to a depth of 52 inches. It is clay in the upper part and clay loam in the lower part. The underlying material to a depth of 61 inches or more is dark red weathered rock that crushes to loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are areas of Cecil, Gwinnett, Madison, and Pacolet soils. Also included are eroded soils that have a clay loam surface layer.

This Hiwassee sandy loam is well suited to most urban and recreation uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

HsC—Hiwassee sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on narrow ridgetops and short hillsides on uplands of the Southern Piedmont. Slopes are smooth or choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark reddish brown sandy loam about 7 inches thick. The subsoil is dark red and extends to a depth of 52 inches. The upper part is clay and the lower part is clay loam. The underlying material to a depth of 63 inches or more is dark red, yellowish brown, and red weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Cecil, Gwinnett, Madison, and Pacolet soils. Also included are eroded soils that have a clay loam surface layer.

This Hiwassee sandy loam soil has only moderate suitability for urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. These limitations commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

HtC2—Hiwassee clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, gently sloping soil is on narrow ridgetops and short hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are choppy and complex. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark reddish brown clay loam about 6 inches thick. The subsoil is dark red and extends to a depth of 46 inches. It is clay in the upper part and clay loam in the lower part. The underlying material to a depth of 62 inches is red or dark red sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. This soil can be worked more easily if it is not too wet or too dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Cecil, Gwinnett, Madison, and Pacolet soils. Also included are a few areas of soils that have a sandy loam surface layer.

This Hiwassee clay loam has only moderate suitability to most urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. These limitations commonly can be overcome by the special design and careful installation of structures.

Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

IrC—Iredell fine sandy loam, 2 to 10 percent slopes. This deep, moderately well drained or somewhat poorly drained, very gently sloping and gently sloping soil is on ridgetops and in lower lying depressions on uplands of the Southern Piedmont. Individual areas range from 3 to 10 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer is light brownish gray fine sandy loam to a depth of 10 inches. The subsoil extends to a depth of 27 inches. The upper few inches is light olive brown sandy clay loam; next is light olive brown clay; and the lower few inches is mottled, strong brown and gray clay. The underlying material to a depth of 44 inches is mottled, weathered rock that crushes to sandy loam. Below this to a depth of 65 inches or more is soft bedrock.

This soil is low in natural fertility and organic matter content. It is medium acid to neutral. Permeability is slow, and available water capacity is high. Tilth is good. Although the root zone is deep, a perched water table commonly is at a depth of 1 foot to 2 feet during winter and spring.

Included with this soil in mapping are small areas of Chestatee, Gwinnett, and Wilkes soils. Also included are small areas of a well drained soil that has a loamy subsoil, a few small areas of a soil that have a solum thickness of more than 40 inches, a few small areas of a soil that have a gravelly sandy loam surface layer and a yellowish red subsoil, and a few areas in which hard rock is at a depth of 24 to 48 inches.

This Iredell fine sandy loam is poorly suited to most urban and recreation uses because of wetness. Slow permeability in the subsoil is a limitation for septic tank absorption fields. Also, extra care is needed in the design and installation of buildings because of the high shrink-swell potential. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the surface layer is thin and clayey.

MdB—Madison sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 30 acres.

Typically, the surface layer is dark brown sandy loam about 6 inches thick. The subsoil is predominantly red and extends to a depth of 34 inches. It contains many flakes of mica. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 75 inches is red, reddish brown, yellowish brown, and weak red weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Madison sandy clay loam. Also included are a few intermingled areas of Cecil, Gwinnett, and Pacolet soils.

This Madison sandy loam is well suited to most urban and recreation uses. However, the moderate permeability of the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. This erosion can be controlled by the establishment of permanent plant cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

MdC—Madison sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on narrow ridgetops on uplands of the Southern Piedmont. Slopes are irregular and convex. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of about 28 inches. It contains many flakes of mica. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is clay loam. The underlying material to a depth of 62 inches is weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Madison sandy clay loam. Also included are a few intermingled areas of Cecil, Gwinnett, and Pacolet soils.

This Madison sandy loam is only moderately suited to most urban and recreation uses because of slope. Also, the moderate permeability of the subsoil is a limitation for septic tank absorption fields. These limitations commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source for topsoil because the surface layer is thin.

MdD—Madison sandy loam, 10 to 15 percent slopes. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is brown sandy loam about 5 inches thick. The subsoil is predominantly red and extends to a depth of 32 inches. It contains many flakes of mica. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is clay loam. The underlying material to a depth of 60 inches is yellowish red and brown rock that easily crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Madison sandy clay loam. Also included are a few intermingled areas of Cecil, Grover, Pacolet, and Sweetapple soils.

This Madison sandy loam is only moderately suited to most urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. These limitations can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

MdE—Madison sandy loam, 15 to 30 percent slopes. This deep, well drained, strongly sloping and steep soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 30 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 5 inches thick. The subsurface layer is dark brown sandy loam and extends to a depth of 9 inches. The subsoil is red and extends to a depth of about 32 inches. It contains many flakes of mica. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is clay loam. The underlying material to a depth of 62 inches or more is soft weathered rock that is gray, dark brown, and olive.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. This soil has good tilth. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Madison sandy clay loam. Also included are a few intermingled areas of Gwinnett, Pacolet, and Sweetapple soils, and a few areas of soils that have a strong brown and light yellowish brown subsoil.

This Madison sandy loam is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of daily cover for sanitary landfill is poor because of slope. Also, this soil is a poor source of topsoil because of slope and because the surface layer is thin.

MfC2—Madison sandy clay loam, 2 to 10 percent slopes, eroded. This deep, well drained, very gently sloping and gently sloping soil is on ridgetops of uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas range from 5 to 30 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of about 28 inches. It contains many flakes of mica. The upper part is clay and the lower part is clay loam. The underlying material to a depth of 39 inches is yellowish red sandy loam and has a few pale brown fragments of schist. Below this to a depth of 62 inches or more is pale brown, yellowish brown, and reddish yellow weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. This soil can be worked more easily if it is not too wet or too dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of soil that have a sandy loam surface layer. Also included are a few intermingled areas of Cecil, Gwinnett, and Pacolet soils.

This Madison sandy clay loam is well suited to most urban uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Most recreation development is only moderately suited because the surface layer is too clayey. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

MfD2—Madison sandy clay loam, 10 to 15 percent slopes, eroded. This deep, well drained, sloping soil is on hillsides of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of about 25 inches. It contains many flakes of mica. The upper few inches is clay and the lower part is sandy clay loam. The underlying material to a depth of 60 inches or more is red and yellowish red, soft weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. The root zone is deep and easily penetrated by plant roots.

Included with this Madison sandy clay loam in mapping are a few areas of soils that have gravelly sandy loam and sandy loam surface layers. Also included are a few intermingled areas of Gwinnett, Pacolet, and Sweetapple soils.

This Madison sandy clay loam is only moderately suited to most urban and recreation uses because of slope. Moderate permeability in the subsoil is a limitation for septic tank absorption fields. Also, recreation use is limited by a clayey surface layer. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

MfE2—Madison sandy clay loam, 15 to 25 percent slopes, eroded. This deep, well drained, strongly sloping soil is on hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of about 23 inches. It contains many flakes of mica. The upper part is clay and the lower several inches are clay loam. The underlying material to a depth of 62 inches or more is red weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of soils that have a gravelly sandy loam and sandy loam surface layer. Also included are a few intermingled areas of Gwinnett, Pacolet, and Sweetapple soils.

This Madison sandy clay loam is poorly suited to urban and most recreation uses because of slope.

Suitability of this soil as a source of daily cover for sanitary landfill and topsoil is poor because of slope. Also, suitability for topsoil is poor because the surface layer is thin.

MvD2—Musella clay loam, 6 to 15 percent slopes, eroded. This well drained, gently sloping and sloping soil is shallow to a layer that restricts root penetration. It is on ridgetops and hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills, galled spots, and shallow gullies are common. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark reddish brown clay loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is dark reddish brown gravelly clay loam and the lower few inches is dark red clay loam that has 35 percent soft rock fragments. The underlying material to a depth of 36 inches is yellowish brown, yellowish red, and strong brown weathered rock that crushes to sandy loam. Red clay loam is in pockets and in cracks and seams among the rock fragments. Below this to a depth of 60 inches or more is yellowish red, strong brown, and yellowish brown soft fractured rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid. Permeability is moderate and available water capacity is low. Tilth is poor.

Included with this soil in mapping are small areas of Gwinnett, Madison, and Pacolet soils. Also included are a few small areas of soil that have hard rock at a depth of less than 40 inches.

This Musella clay loam is only moderately suited to most urban uses because of depth to rock. Also, because the surface layer is too clayey, it is only moderately suited to most recreation uses. Erosion is a hazard on construction sites. This erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the surface layer is thin.

MvE2—Musella clay loam, 15 to 25 percent slopes, eroded. This well drained strongly sloping soil is shallow to a layer that restricts root penetration. It is on hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills, galled spots, and shallow gullies are common. Slopes are irregular and choppy. Individual areas range from 5 to 25 acres.

Typically, the surface layer is dark reddish brown clay loam about 4 inches thick. The subsoil is dark red gravelly clay loam and extends to a depth of 16 inches; the lower few inches contains about 35 percent soft rock fragments. The underlying material to a depth of 33 inches is red, yellowish brown, and yellowish red weathered rock that crushes to sandy loam. It contains 10 percent red clay loamy material in pockets and in cracks and seams among rock fragments. Below this to a depth of 60 inches or more is soft red and yellowish red hornblende gneiss and schist that is broken and fractured.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid. Permeability is moderate and available water capacity is low. Tilth is poor.

Included with this soil in mapping are small areas of Gwinnett, Madison, and Pacolet soils. A few areas of soils that have a red subsoil are included. Also included are a few small areas of soil that have hard rock at a depth of less than 40 inches.

This Musella clay loam is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the surface layer is thin.

MwD—Musella stony sandy clay loam, 6 to 15 percent slopes. This well drained, gently sloping and sloping soil is shallow to a layer that restricts root penetration. It is on ridgetops and hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 3 to 25 acres.

Typically, about 5 percent of the surface is covered with stones. The surface layer is dark reddish brown stony sandy clay loam about 6 inches thick. The subsoil is a dark red clay loam that extends to a depth of 20 inches. The underlying material to a depth of 60 inches or more is yellowish brown, yellowish red, red, gray, and strong brown weathered rock that crushes to gravelly loam. It contains about 10 percent, by volume, red clay loam in pockets and in cracks and seams among rock fragments.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid. Permeability is moderate and available water capacity is low. Because of stones on the surface, the soil is difficult to work.

Included with this soil in mapping are small areas of Chestatee, Gwinnett, and Pacolet soils. Also included are a few small areas of soil that have hard rock at a depth of less than 40 inches.

This Musella stony sandy clay loam is only moderately suited to most urban uses because of large stones and depth to rock. Also, because the surface layer is too clayey, it is only moderately suited to recreation uses.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because of large stones and because the surface layer is thin.

MwF—Musella stony sandy clay loam, 15 to 45 percent slopes. This well drained, strongly sloping and steep soil is shallow to a layer that restricts root penetration. It is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 20 acres.

Typically, about 5 percent of the surface is covered with stones. The surface layer is dark reddish brown stony sandy clay loam about 5 inches thick. The subsoil extends to a depth of 19 inches and is predominantly dark red gravelly clay loam. The underlying material to a depth of 65 inches or more is red, yellowish brown, and yellowish red weathered rock. It contains about 5 percent dark red loamy material in pockets, cracks, and seams among rock fragments.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid. Permeability is moderate, and available water capacity is low. Because of slope and stones, the soil is difficult to work.

Included with this soil in mapping are small areas of Chestatee, Gwinnett, and Pacolet soils. Also included are a few areas of soil that have a stony loam or a clay loam surface layer, a few small areas of soil that have hard rock at a depth less than 40 inches, and several areas of soil that have a solum more than 40 inches thick.

This Musella stony sandy clay loam is poorly suited to urban and recreation uses because of slope.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the surface layer is thin and because large stones are on the surface.

PfC—Pacolet sandy loam, 2 to 10 percent slopes. This deep, well drained, very gently sloping and gently sloping soil is on narrow ridgetops on uplands of the Southern Piedmont. Slopes are irregular and convex. Individual areas range from 5 to 40 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsoil is predominantly red and extends to a depth of 36 inches. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 66 inches or more is weathered rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few eroded areas of Pacolet sandy clay loam. Also included are a few intermingled areas of Appling, Ashlar, Cecil, Gwinnett, and Madison soils.

This Pacolet sandy loam is well suited to most urban and recreation uses. However, the moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

PfD—Pacolet sandy loam, 10 to 15 percent slopes. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 35 acres.

Typically, the surface layer is brown sandy loam about 4 inches thick. The subsurface layer is brown sandy loam about 5 inches thick. The subsoil is predominantly red and extends to a depth of 34 inches. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam. The underlying material to a depth of 60 inches or more is weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few intermingled areas of Cecil, Gwinnett, Madison, and Wedowee soils. Also included are a few areas of Pacolet sandy clay loam.

This Pacolet sandy loam soil is only moderately suited to most urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and the clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

PfE—Pacolet sandy loam, 15 to 30 percent slopes. This deep, well drained, strongly sloping and steep soil is on hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 25 acres.

Typically, the surface layer is brown sandy loam about 4 inches thick. The subsurface layer is brown sandy loam and extends to a depth of 8 inches. The subsoil is predominantly red and extends to a depth of 38 inches. The upper few inches is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam that has a few yellowish brown and strong brown mottles. The underlying material to a depth of 60 inches or more is red and yellowish red weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few intermingled areas of Ashlar, Gwinnett, Madison, and Wedowee soils. Also included are a few areas of Pacolet sandy clay loam.

This soil is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of daily cover for sanitary landfill is poor because of slope. This soil is also a poor source of topsoil because of slope and because the surface layer is thin.

PgC2—Pacolet sandy clay loam, 2 to 10 percent slopes, eroded. This deep, well drained, very gently sloping and gently sloping soil is on ridgetops of uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual soil areas range from 5 to 15 acres.

Typically, the surface layer is reddish brown sandy clay loam about 4 inches thick. The subsoil is red and extends to a depth of 26 inches. The upper part is clay and the lower part is sandy clay loam. The underlying material to a depth of 61 inches or more is gray and red weathered rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except

for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. This soil can be worked more easily if it is not too wet or too dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of soil that have a sandy loam surface layer. Also included are a few intermingled areas of Appling, Cecil, Gwinnett, and Madison soils.

This Pacolet sandy clay loam is well suited to most urban uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be overcome by the special design and careful installation of structures. This soil is only moderately suited to most recreation uses because the surface layer is too clayey. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

PgD2—Pacolet sandy clay loam, 10 to 15 percent slopes, eroded. This deep, well drained, sloping soil is on hillsides on uplands of the Southern Piedmont. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and choppy. Individual soil areas range from 5 to 25 acres.

Typically, the surface layer is reddish brown sandy clay loam about 4 inches thick. The subsoil is predominantly red and extends to a depth of 32 inches. The upper part is clay, and the lower part is clay loam that has a few strong brown mottles. The underlying material to a depth of 60 inches or more is red, strong brown, yellowish red, and yellowish brown weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is poor. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few areas of soil that have a sandy loam surface layer. Also included are a few intermingled areas of Cecil, Gwinnett, and Madison soils.

This Pacolet sandy clay loam is moderately suited to most urban and recreation uses because of slope. Moderate permeability in the subsoil is a limitation for septic tank absorption fields. Also, a clayey surface layer limits recreation use. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and a clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

PuE—Pacolet-Urban land complex, 10 to 25 percent slopes. This unit consists of Pacolet soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. This deep, well drained, sloping and strongly sloping unit is on hillsides on uplands of the Southern Piedmont. Mapped areas range from 5 to 200 acres.

Pacolet soils make up about 70 percent of each mapped area. Typically, Pacolet soils have a brown sandy loam surface layer about 6 inches thick. The subsoil extends to a depth of about 36 inches. The upper part is yellowish red sandy clay loam, the middle part is red clay, and the lower part is yellowish red sandy clay loam. The underlying material to a depth of 65 inches or more is red, yellowish red, strong brown and yellowish brown weathered rock.

Pacolet soils are low in natural fertility and organic matter content. These soils are strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Urban land makes up 25 percent of each mapped area. The soils have been altered by cutting, filling, and shaping. Most urban land is used for private dwellings, streets, and sidewalks.

Included with this unit in mapping are eroded areas of Pacolet sandy clay loam. Most of these eroded soils are dissected by shallow gullies. Also included are small intermingled areas of Ashlar, Madison, and Gwinnett soils.

This Pacolet-Urban land complex is poorly suited to most urban and recreation uses because of slope. However, this limitation commonly can be overcome by the special design and careful installation of structures. The common plants used for landscaping and vegetable gardens grow well on this unit. Erosion, however, is a severe hazard prior to establishment of permanent ground cover.

Pw—Pits, quarries. This map unit consists of granite quarries that make up 545 acres in the county (fig. 4). Individual areas range from 3 to 240 acres. Open pits range to 75 feet in depth and expose hard granite and gneiss bedrock and weathered rock.

This map unit is poorly suited to most uses. However, it is a good source of crushed stone, rock dust, and building stone. Rock is crushed and stockpiled in most mapped areas.

Rx—Rock outcrop. This map unit is about 90 percent granite and gneiss bedrock that is bare and hard (fig. 5). It is on ridgetops and hillsides on uplands of the

Figure 4.—Typical rock quarry. The granite bedrock is a source of crushed stone, rock dust, and building stone.

Southern Piedmont and makes up about 2,000 acres of the county. Individual areas range from 3 to 500 acres. Stone Mountain and Arabia Mountain are in this unit.

This map unit can be used to a limited extent for recreation. It is a good source of crushed stone, rock dust, and building stone.

SgD—Sweetapple-Grover complex, 6 to 15 percent slopes. This unit consists of Sweetapple and Grover soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are moderately deep and somewhat excessively drained and well drained. This gently sloping and sloping unit is on hillsides on uplands of the Southern Piedmont. Individual areas range from 3 to 20 acres.

Sweetapple fine sandy loam makes up about 45 percent of each mapped area. Typically, the surface layer is dark yellowish brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 18 inches. The underlying material to a depth of 36 inches is yellowish red and brownish yellow weathered rock that crushes to sandy loam. Soft mica schist extends to a depth of 60 inches or more.

This Sweetapple soil is low in natural fertility and organic matter content. It is very strongly acid to medium acid throughout except in areas that have been limed. Permeability is moderately rapid, and available water capacity is low. Tilth is good. Root penetration is limited by the underlying soft bedrock.

Grover fine sandy loam makes up about 40 percent of each mapped area. Typically, the surface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown and extends to a depth of 30 inches. It contains many flakes of mica. The upper part is sandy loam, the middle part is sandy clay loam, and the lower

part is sandy loam. The underlying material to a depth of 61 inches or more is weathered rock.

This Grover soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with these soils in mapping are small areas of Gwinnett, Madison, and Pacolet soils. Also included are intermingled areas of soils that have hard bedrock at a depth of less than 48 inches and soils that have a stony surface layer.

This Sweetapple-Grover complex is only moderately suited to urban and recreation uses because of slope. Also, soft rock is at a depth of about 2 to 4 feet in much of the area and limits most sanitary facilities.

Suitability of these soils as a source of topsoil and daily cover for sanitary landfill is only fair because of slope and because the borrow area is difficult to reclaim in many places.

SgF—Sweetapple-Grover complex, 15 to 45 percent slopes. This map unit consists of Sweetapple and Grover soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are moderately deep or deep, and somewhat excessively drained and well drained. This strongly sloping to steep unit is on hillsides on uplands of the Southern Piedmont. Individual areas range from 3 to 45 acres.

Sweetapple fine sandy loam makes up about 45 percent of each mapped area. Typically, the surface layer is dark yellowish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 26 inches. The upper few inches are strong brown fine sandy loam, and the rest is predominantly yellowish brown gravelly sandy loam. The underlying material to a depth of 60 inches or more is reddish yellow, grayish

Figure 5.—An area of rock outcrop that is virtually devoid of vegetation. In the background, the soils are deep enough to support a growth of hardwoods.

brown, gray, and very dark grayish brown mica schist and mica gneiss that crushes to sandy loam.

This Sweetapple soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid. Permeability is moderately rapid, and available water capacity is low. Tilth is good. Root penetration is limited by the underlying soft bedrock.

Grover fine sandy loam makes up about 40 percent of each mapped area. Typically, the surface layer is dark brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 34 inches. It contains many flakes of mica. The upper part is strong brown sandy loam and the rest is yellowish red sandy clay loam except for the lower part, which is sandy loam. The underlying material to a depth of 62 inches or more is weathered rock.

This Grover soil is low in natural fertility and organic matter content. This soil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Included with these soils in mapping are small areas of Gwinnett, Madison, and Pacolet soils. Also included are a few small areas of soil that have hard bedrock at a depth of less than 48 inches and have a stony surface layer.

This Sweetapple-Grover complex is poorly suited to urban and recreation uses because of slope. Also, soft rock is at a depth of 2 to 4 feet in much of the area and limits most sanitary facilities.

Suitability of these soils as a source of topsoil and daily cover for sanitary landfill is poor because of slope.

Tf—Toccoa sandy loam, frequently flooded. This deep, well drained, nearly level soil is on flood plains in the Southern Piedmont. Slope is 0 to 2 percent. It is frequently flooded for brief periods during winter and early in spring. Individual areas range from 3 to 100 acres.

Typically, the surface layer is sandy loam about 12 inches thick. The upper part is dark brown, and the lower part is reddish brown. The underlying layers to a depth of 34 inches are reddish brown sandy loam. Below that to a depth of 62 inches or more is dark brown sandy loam.

This soil is slightly acid to strongly acid throughout. However, some part of the profile between depths of 8 and 40 inches is medium acid or slightly acid. Permeability is moderately rapid, and available water capacity is medium. Tilth is good. The root zone is deep, but a water table commonly is at a depth of 2.5 to 5.0 feet in winter and spring.

Included with this soil in mapping are small areas of Altavista, Cartecay, and Wehadkee soils. Also included are a few small areas of soil that are sandy to a depth of 3 or 4 feet or more and areas of soil that have a sandy clay loam subsoil.

This soil is poorly suited to recreation use because of flooding. Flooding is a severe limitation to urban uses. This limitation can be overcome only by extensive flood control.

Suitability of this soil as a source of daily cover for sanitary landfill and topsoil is good.

To—Toccoa sandy loam, high. This deep, well drained, very gently sloping soil commonly is near heads of drainageways and at the base of uplands in the Southern Piedmont. Slope is 2 to 3 percent. Flooding is not a concern. Individual areas range from 3 to 10 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The underlying layers to a depth of 60 inches or more are dark yellowish brown loam and yellowish brown sandy loam.

This soil is slightly acid to strongly acid throughout. However, some part of the profile between depths of 10 and 40 inches is medium acid or slightly acid. Permeability is moderately rapid, and available water capacity is medium. Tilth is good. The root zone is deep, but a water table is at a depth of 2.5 to 5.0 feet in winter and spring.

Included with this soil in mapping are small areas of Altavista, Appling, and Cartecay soils. A few small areas of soils that are sandy to a depth of 3 feet or more are included with this soil. Also included are small areas of well drained soil that have a sandy clay loam subsoil.

This soil is well suited to most urban and recreation uses. However, seepage and wetness are limitations for most sanitary facilities. These limitations commonly can be overcome by the special design and careful installation of structures.

Suitability of this soil as a source for sanitary landfill and topsoil is good.

Ub—Udorthents, 2 to 10 percent slopes. This map unit consists of areas that have been modified by cutting and removal of the soil material. The cuts commonly range from 3 to 40 feet in depth and expose granite, gneiss, schist, or weathered rock. Individual areas range from 2 to 45 acres.

This map unit is poorly suited to most uses. Erosion is a severe hazard, but it can be controlled by planting grasses, legumes, vines, woody plants, or other suitable vegetation (fig. 6). Covering areas of Udorthents with topsoil, applying fertilizers, and using other good management practices help maintain adequate plant cover.

Ud—Urban land. This map unit consists of part of the metropolitan area of Atlanta and the cities of Decatur, Avondale Estates, Clarkston, Stone Mountain, Lithonia, and Tucker. The Southern Piedmont landscape is mainly ridgetops and hillsides associated with drainageways and flood plains. Commonly, the soil has been cut, filled, shaped, and smoothed. In places, the cuts are deep and expose weathered mica schist, granite, or gneiss.

Urban land makes up more than 85 percent of the mapped area (fig. 7). It is mainly business districts, shopping centers, schools, parking lots, motels,

Figure 6.—An area of Udorthents, 2 to 10 percent slopes. Erosion is a severe hazard, but the young loblolly pine and other adapted vegetation help to control this hazard.

industries, housing developments, and airports. A few minor areas are wooded or in grass.

Erosion is a severe hazard in most areas during construction. Runoff from uplands is a hazard in urban areas on flood plains.

WeB—Wedowee sandy loam, 2 to 6 percent slopes. This deep, well drained, very gently sloping soil is on ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 30 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsurface layer is brownish yellow sandy loam and extends to a depth of 11 inches. The subsoil extends to a depth of 39 inches. The upper part is strong brown sandy clay loam, the middle part is yellowish brown clay that has yellowish red and brownish yellow mottles, and the lower part is yellowish brown sandy clay loam that has yellowish red mottles and red sandy loam lenses. The underlying material to a depth of 75 inches or more is red, white, pale yellow, and yellowish brown weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of soils that have a loamy sand surface layer, and a few eroded soils that have a sandy clay loam surface layer. Also included are small areas of Appling, Ashlar, and Pacolet soils; small areas of soils that are less than 40 inches to hard rock; and small areas of rock outcrop.

This Wedowee sandy loam is well suited to most urban and recreation uses. However, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This limitation commonly can be

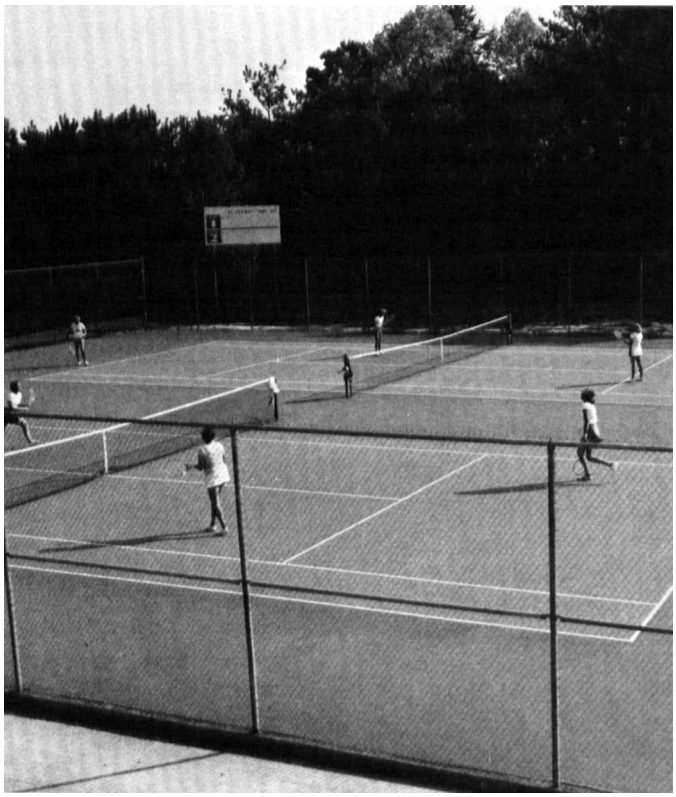


Figure 7.—Tennis courts in an area that is about 85 percent urban development.

overcome by the careful design and installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because the subsoil is clayey. This soil is a poor source of topsoil because the surface layer is thin.

WeC—Wedowee sandy loam, 6 to 10 percent slopes. This deep, well drained, gently sloping soil is on long, narrow ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 40 acres.

Typically, the surface layer is yellowish brown sandy loam about 5 inches thick. The subsoil extends to a depth of 31 inches and is strong brown and has red and yellow mottles. The upper part is clay and the lower part is sandy clay loam. The underlying material to a depth of 66 inches or more is weathered rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are a few eroded soils that have a sandy clay loam surface layer, and a few soils that have a loamy sand surface layer. Also included are small areas of Appling, Ashlar, and Pacolet soils; soils that are less than 40 inches to hard rock; and small areas of rock outcrop.

This Wedowee sandy loam is only moderately suited to most urban and recreation uses because of slope. Also, moderate permeability in the subsoil is a limitation for septic tank absorption fields. This commonly can be overcome by the special design and careful installation of structures. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of daily cover for sanitary landfill is only fair because of slope and a clayey subsoil. This soil is a poor source of topsoil because the surface layer is thin.

WeE—Wedowee sandy loam, 10 to 25 percent slopes. This deep, well drained, sloping and strongly sloping soil is on short to moderately long hillsides on uplands of the Southern Piedmont. Slopes are choppy and irregular. Individual areas range from 5 to 20 acres.

Typically, the surface layer is dark yellowish brown sandy loam about 5 inches thick. The subsoil extends to a depth of 36 inches. The upper few inches is yellowish brown sandy clay loam, the middle part is strong brown clay that has red and yellowish red mottles, and the lower part is strong brown sandy clay loam that has yellowish brown and red mottles. The underlying material to a depth of 62 inches or more is yellowish red, red, light gray, and pale brown weathered rock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed. Permeability is moderate, and available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of soil moisture. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are soils that have a loamy sand surface layer and a few eroded soils that have a sandy clay loam surface layer. Also included are a few intermingled areas of Appling, Ashlar, and Pacolet soils; small areas of soil that are less than 40 inches to hard rock; and small areas of rock outcrop.

This Wedowee sandy loam is poorly suited to most urban and recreation uses because of slope.

Suitability of this soil as a source of daily cover for sanitary landfill is poor because of slope. This soil is also a poor source for topsoil because of slope and because the surface layer is thin.

Wf—Wehadkee silt loam, frequently flooded. This deep, poorly drained, nearly level soil is in depressions on flood plains of the Southern Piedmont. Slope is 0 to 2 percent. It is frequently flooded for brief periods, commonly from late in fall to early in summer. Individual areas range from 3 to 30 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 43 inches. It is dark gray silty clay loam that has strong brown and yellowish brown mottles. The underlying material to a depth of 62 inches or more is gray loam that has yellowish brown mottles.

Wehadkee soils are slightly acid or medium acid. Permeability is moderate, and available water capacity is high. Tilth is fair. The root zone is deep, but a water table commonly ranges from the surface to a depth of 2.5 feet from late in fall to early in summer and limits plant growth.

Included with this soil in mapping are small areas of Cartecay and Toccoa soils.

This Wehadkee silt loam is poorly suited to urban and recreation uses because of wetness and flooding. These limitations can only be overcome by extensive flood control and drainage.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because of wetness.

WkC—Wilkes sandy loam, 2 to 10 percent slopes. This well drained, very gently sloping and gently sloping soil is moderately deep to a layer that restricts root penetration. It is on narrow ridgetops on uplands of the Southern Piedmont. Slopes are smooth and convex. Individual areas range from 5 to 35 acres.

Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. The yellowish brown subsoil extends to a depth of 16 inches. The upper few inches is sandy loam and the rest is sandy clay loam. The underlying material to a depth of 28 inches is weathered rock. Below to a depth of 40 inches is soft bedrock. Hard rock is at a depth of 40 inches or more.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid in the surface layer, ranges from strongly acid to neutral in the subsoil, and is slightly acid or neutral in the underlying material. Permeability is moderately slow, and available water capacity is medium. Tilth is good.

Included with this soil in mapping are small areas of Gwinnett, Iredell, and Pacolet soils. Also included are a few areas of soils that have a black or olive, fine sandy loam surface layer and a few small areas of soils that have a sandy loam subsoil and hard rock at a depth of less than 40 inches.

This Wilkes sandy loam is poorly suited to most urban uses and to septic tank absorption fields because of depth to rock (fig. 8). However, it is well suited to most recreation uses. Erosion is a hazard on construction sites. The erosion can be controlled by the establishment of permanent ground cover and by mulching. Mulching also helps control erosion in areas used for vegetable gardens.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the soil layer is thin and the area is difficult to reclaim.

WkE—Wilkes sandy loam, 10 to 25 percent slopes. This well drained, sloping and strongly sloping soil is moderately deep to a layer that restricts root penetration. It is on short hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 65 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 6 inches thick. The subsoil extends to a depth of 16 inches. The subsoil is yellowish brown throughout, but also has brownish yellow mottles in the lower part. The upper few inches is sandy clay loam, and the lower part is clay. The underlying material to a depth of 42 inches is brownish yellow, light gray, and dark greenish gray weathered rock that crushes to sandy loam. Hard rock is below a depth of 42 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid in the surface layer, strongly acid to neutral in the subsoil, and is slightly acid or neutral in the underlying material. Permeability is moderately slow, and available water capacity is medium. Tilth is good.

Included with this soil in mapping are small areas of Gwinnett and Iredell soils. Also included are a few small areas of soil that have a sandy loam subsoil and hard rock at a depth of less than 40 inches.

This Wilkes sandy loam is poorly suited to urban and recreation uses because of slope. Also, depth to rock is a limitation for sanitary facilities.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the soil layer is thin and the area is difficult to reclaim because of slope.

WmD—Wilkes stony sandy loam, 6 to 15 percent slopes. This well drained, gently sloping and sloping soil is moderately deep to a layer that restricts root penetration. It is on short hillsides on uplands of the Southern Piedmont. Slopes are short and choppy. Individual areas range from 3 to 95 acres.

Typically, the surface is partly covered with a few stones and boulders. The surface layer is very dark grayish brown stony sandy loam about 6 inches thick. The subsurface layer is light olive brown gravelly sandy loam about 5 inches thick. The subsoil extends to a depth of 19 inches. It is yellowish brown clay that has a few yellowish red mottles. The underlying material to a depth of 48 inches is olive yellow, yellowish red, and strong brown weathered rock that crushes to loam.

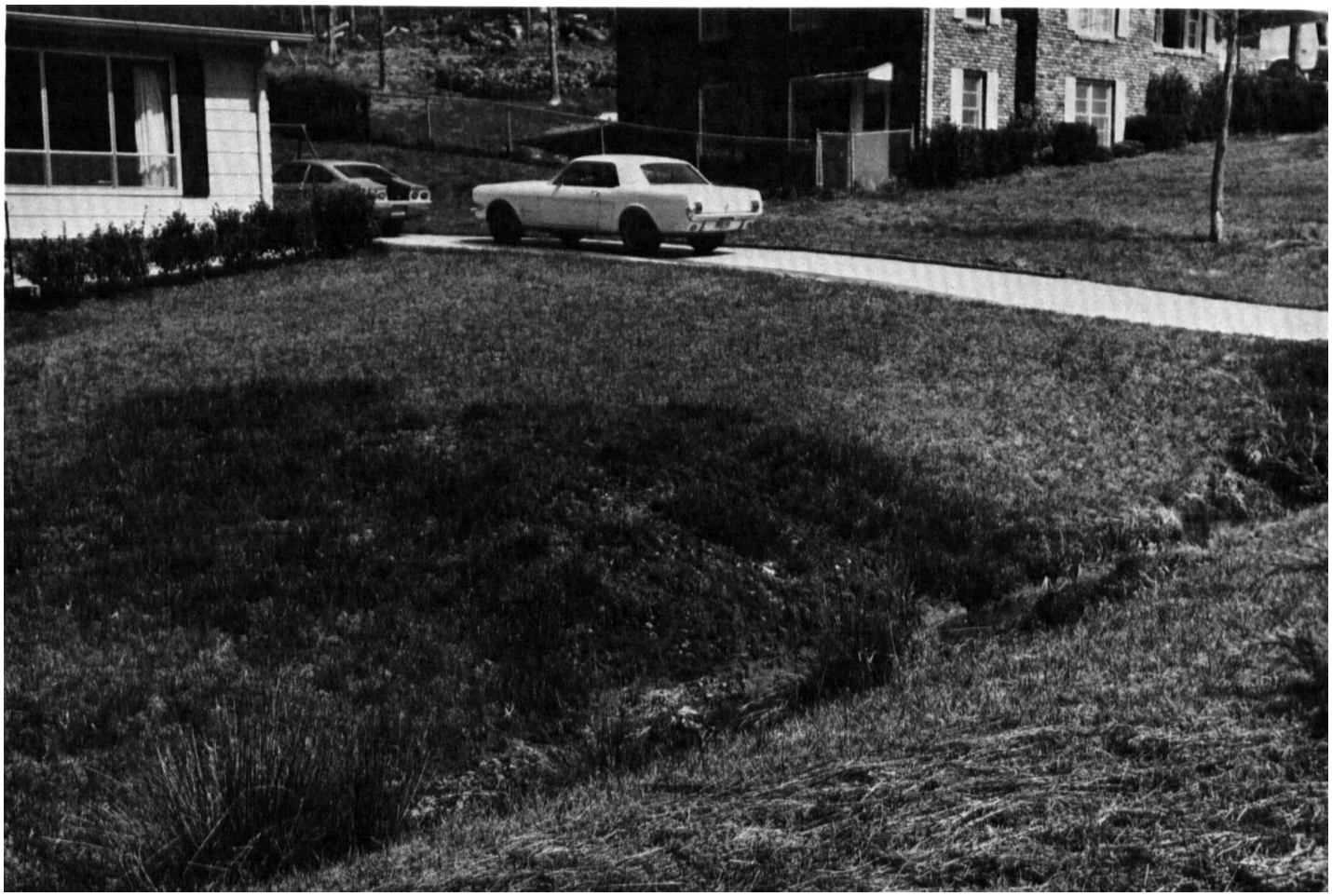


Figure 8.—Dark area in lawn is evidence of malfunctioning septic tank absorption field on Wilkes sandy loam, 2 to 10 percent slopes.

Below this to a depth of 60 inches or more is olive, brownish yellow, gray, and greenish gray soft bedrock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid in the surface layer, is strongly acid to neutral in the subsoil, and is slightly acid or neutral in the underlying material. Permeability is moderately slow, and available water capacity is medium. Because of stones and boulders on the surface, the soil is difficult to work.

Included with this soil in mapping are small areas of Iredell soils. Also included are a few areas of soil that have an olive or light olive gray sandy loam surface layer and a few small areas of soils that have a sandy loam subsoil and hard rock at a depth of less than 40 inches.

This Wilkes sandy loam is poorly suited to most urban use because of depth to rock. It is only moderately suited to recreation uses because slope and small stones limit such use.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because the soil layer is thin, the area is difficult to reclaim, and large stones are present.

WmF—Wilkes stony sandy loam, 15 to 45 percent slopes. This well drained, strongly sloping and steep soil is moderately deep to a layer that restricts root penetration. It is on short hillsides on uplands of the Southern Piedmont. Slopes are irregular and choppy. Individual areas range from 5 to 125 acres.

Typically, the surface is partly covered with a few stones and boulders. The surface layer is very dark grayish brown stony sandy loam about 6 inches thick. The subsurface layer is brown gravelly sandy loam about 3 inches thick. The subsoil to a depth of 17 inches is yellowish brown clay. The underlying material to a depth of 52 inches is yellowish brown, brownish yellow, strong brown, and olive weathered rock that crushes to loam. Below this to a depth of 60 inches or more is olive, light

yellowish brown, greenish gray, and gray soft bedrock that crushes to sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or medium acid in the surface layer, ranges from strongly acid to neutral in the subsoil, and is slightly acid or neutral in the underlying material. Permeability is moderately slow, and available water capacity is medium. Because of stones and boulders on the surface, the soil is difficult to work.

Included with this soil in mapping are small areas of Chestatee and Iredell soils. Also included are a few small areas of soil that have an olive yellow, brown, and olive subsoil and soils that have hard rock at a depth of less than 40 inches. A few areas of soil are included that are more than 40 inches thick to the underlying material.

This Wilkes stony sandy loam is poorly suited to urban and recreation uses because of slope. Also, depth to rock is a limitation for sanitary facilities.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because of the slope, thin surface layer, difficulty of reclaiming the area, and presence of large stones.

WoB—Worsham sandy loam, 2 to 6 percent slopes. This deep, poorly drained, very gently sloping soil is within the Southern Piedmont in depressions, at the upper ends of drainageways, and at the base of hillsides. Individual areas range from about 3 to 5 acres.

Typically, the surface layer is very dark gray sandy loam about 5 inches thick. The subsurface layer is gray sandy loam about 7 inches thick. The subsoil extends to a depth of about 56 inches. The upper part is light gray sandy clay loam and has brownish yellow mottles, the middle part is light gray sandy clay loam and has light yellowish brown mottles, and the lower part is light gray sandy clay loam. The underlying material to a depth of 60 inches or more is gray sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid. Permeability is moderately slow or slow, and available water capacity is medium. Tilth is poor. The root zone is deep, but a water table commonly is at a depth of 0 to 1.0 foot from late in fall to spring and limits plant growth.

Included with this soil in mapping are small areas of a somewhat poorly drained soil.

This Worsham sandy loam is poorly suited to urban and recreation uses because of wetness. This limitation can be overcome only by drainage. Moderately slow or slow permeability is a limitation for septic tank absorption fields.

Suitability of this soil as a source of topsoil and daily cover for sanitary landfill is poor because of wetness.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops. If it is properly treated and high level management and acceptable farming methods are used, prime farmland produces the highest yields with minimal imputs of energy and economic resources, and its use results in the least damage to the environment.

Prime farmland in DeKalb County can now be in cropland, pastureland, woodland, or other land uses but not in urban land and built-up land, or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland generally has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable acidity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland consult the local staff of the Soil Conservation Service.

About 8,900 acres or 5 percent of DeKalb County meets the soil requirements for prime farmland. Areas are scattered throughout the county but most are in the southern and eastern parts, mainly in the Gwinnett-Cecil-Madison general soil map unit.

Trend in land use in the county has been a significant loss of prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible and difficult to cultivate and generally are less productive.

Soil map units that make up prime farmland in DeKalb County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. Changes in land use to urban or similar uses since the soil survey was made preclude the use of the soils for farming. Therefore, the actual extent of the soil in each map unit is an estimate. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

The map units that meet the soil requirements for prime farmland are:

AkA—Altavista fine sandy loam, 0 to 2 percent slopes
AkB—Altavista fine sandy loam, 2 to 6 percent slopes
AmB—Appling sandy loam, 2 to 6 percent slopes
AmC—Appling sandy loam, 6 to 10 percent slopes
CeB—Cecil sandy loam, 2 to 6 percent slopes
GeB—Gwinnett sandy loam, 2 to 6 percent slopes
HsB—Hiwassee sandy loam, 2 to 6 percent slopes
MdB—Madison sandy loam, 2 to 6 percent slopes
To—Toccoa sandy loam, high
WeB—Wedowee sandy loam, 2 to 6 percent slopes

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and suitabilities of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils as sites for buildings, sanitary facilities, highways and other transportation systems, and for parks and other recreation facilities. It can be used to identify the suitability and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

recreation

The soils of the survey area are rated in table 5 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 5, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 5 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 7 and interpretations for dwellings without basements and for local roads and streets in table 6.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The

best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

engineering

Jack G. Lamb, civil engineer, Soil Conservation Service, helped to prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 6 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family

dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. The ratings for lawns and landscaping are also applicable to vegetable gardens. The best soils for lawns and landscaping are also the best soils for vegetable gardens.

sanitary facilities

Table 7 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 7 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 7 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of

landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 7 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 8 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill sand, gravel, and topsoil. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 8 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, reaction, and stratification are given in the soil series descriptions and in table 10.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and

cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 9 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones, boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 13.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 10 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 13.

Rock fragments more than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 11 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

soil and water features

Table 12 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and

soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 12 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 12 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 12.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

engineering index test data

Table 13 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and their morphology." The soil samples were tested by the Department of Transportation, State of Georgia, Office of Materials and Research.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis or Grain size distribution—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM); Volume change (Abercrombie)—Georgia Highway Standard.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*7*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 14, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*6*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*7*). Soil depth is the thickness of soil material overlying a lithic or paralithic contact. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Altavista series

The Altavista series consists of deep, moderately well drained soils that formed in loamy sediment. Permeability is moderate. These nearly level to very gently sloping soils are on stream terraces of the Southern Piedmont. The seasonal high water table is within a depth of 1.5 to 2.5 feet in winter and early in spring. Slope is 0 to 6 percent.

The Altavista soils are geographically closely associated with Cartecay, Toccoa, and Wehadkee soils. The associated soils are on flood plains and do not have an argillic horizon.

Typical pedon of Altavista fine sandy loam, 2 to 6 percent slopes, in an area of loblolly pine with an understory of sweetgum, blackgum, water oak, white oak, and red oak; 1.12 miles southeast of the town of Lithonia; 0.13 mile south of Interstate Highway 20; 0.04 mile southwest of Honey Creek:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; few pebbles; many fine roots; strongly acid; clear smooth boundary.

A2—8 to 13 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak fine granular structure; friable; common fine roots; few fine pores; few dark brown wormcasts; few pebbles; medium acid; clear wavy boundary.

B1—13 to 18 inches; brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable; few pebbles; few fine red concretions; few fine roots; medium acid; clear wavy boundary.

B21t—18 to 26 inches; brownish yellow (10YR 6/6) clay loam; common fine distinct gray and yellowish red mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; few pebbles; few fine flakes of mica; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.

B22t—26 to 37 inches; yellowish brown (10YR 5/8) sandy clay loam; common fine distinct gray and yellowish red mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine flakes of mica; thin patchy clay films on faces of peds; medium acid; clear smooth boundary.

B23t—37 to 44 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine prominent reddish brown mottles and common fine and medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine flakes of mica; thin patchy clay films on faces of peds; few pebbles; strongly acid; clear wavy boundary.

B3—44 to 53 inches; mottled brownish yellow, strong brown, gray, and reddish brown sandy clay loam; weak medium subangular blocky structure; firm; few fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

C1—53 to 74 inches; pale yellow (2.5Y 7/4) gravelly sandy loam; common medium distinct gray (10YR 6/1) mottles and few medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; few fine roots; few fine flakes of mica; few thin clay lenses; strongly acid; abrupt wavy boundary.

C2—74 to 88 inches; mottled and streaked light olive gray, white, yellowish brown, and yellowish red strongly weathered saprolite; friable in place, fine sandy loam if crushed; few fine roots; many fine flakes of mica; strongly acid.

The solum ranges from 34 to 57 inches in thickness. The soil ranges from very strongly acid to medium acid. If pebbles are present, they are few in the A and B horizons and range to common in the C horizon.

The Ap horizon has hue of 7.5YR, value of 4 or 5, and chroma of 2 or 4, or value of 6 and chroma of 4; or it has hue of 10YR, value of 4 or 5, and chroma of 2 or 3, or value of 5 or 6 and chroma of 4; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2; or value of 6 and chroma of 4. If an A2 horizon is present, it has hue of 10YR, value of 6, and chroma of 3 or 4; or it has hue of 2.5Y, value of 6, and chroma of 4. The A horizon is fine sandy loam or sandy loam.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 or 8. It is sandy clay loam or clay loam. Flakes of mica are few or common. If mottles are present in the B21t horizon, they are few or common and gray to yellowish red. The B22t horizon has few to many gray, brown, and yellowish red mottles, and the B23t horizon has few or common gray and reddish brown mottles. The B3 horizon has few to many gray, brown, or yellowish red mottles.

The C horizon commonly is sandy loam or gravelly sandy loam, or it is soft saprolite that has gray, brown, yellow, and red mottles. A few pedons have a IIC horizon that is gray clay and has strong brown and brownish yellow mottles.

Appling series

The Appling series consists of deep, well drained soils that formed in material weathered from schist, gneiss, and granite. Permeability is moderate. These very gently sloping and gently sloping soils are on uplands of the Southern Piedmont. Slope is 2 to 10 percent.

The Appling soils are geographically closely associated with Ashlar, Cecil, Pacolet, and Wedowee soils. Ashlar soils have hard bedrock at a depth between 22 and 40 inches. Cecil and Pacolet soils have a red subsoil, and Pacolet soils and Wedowee soils have a thinner solum than the Appling soils.

Typical pedon of Appling sandy loam, 2 to 6 percent slopes, in an area of loblolly pine; 0.8 mile south of Swift Creek; 2.5 miles north of the town of Lithonia; 1.1 miles west of Georgia Highway 124:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; many fine and medium roots; few wormholes and root channels filled with dark grayish brown sandy loam; very strongly acid; clear smooth boundary.

A2—7 to 14 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

B1—14 to 18 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots;

few soft brownish yellow rock fragments; strongly acid; clear smooth boundary.
B21t—18 to 26 inches; yellowish brown (10YR 5/6) sandy clay; few medium distinct yellowish red (5YR 4/6) mottles; moderate medium angular blocky structure; firm; common fine roots; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.
B22t—26 to 38 inches; yellowish brown (10YR 5/6) sandy clay; few medium prominent red (2.5YR 4/8) mottles and few fine faint brownish yellow mottles; moderate medium angular blocky structure; firm; thin patchy clay films on faces of peds; few fine roots; strongly acid; clear smooth boundary.
B3—38 to 55 inches; mottled yellowish red (5YR 5/8), red (2.5YR 4/8), and yellowish brown (10YR 5/6) clay loam; weak medium angular blocky structure; friable; few soft brownish yellow rock fragments; strongly acid; gradual wavy boundary.
C—55 to 68 inches; red (2.5YR 4/8) sandy loam; few fine faint yellowish red mottles; massive; friable; few quartz pebbles; few thin yellowish brown lenses of clay, about 3 percent by volume; strongly acid.

The solum ranges from 44 to 60 inches in thickness. The soil is very strongly acid or strongly acid except for the surface layer in areas that have been limed.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3; or it has hue of 10YR, value of 5 or 6, and chroma of 2 or 4. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4, or it has hue of 2.5Y, value of 6, and chroma of 4.

If the B1 horizon is present, it has hue of 10YR, value of 5, and chroma of 4, 6, or 8. The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. It is clay loam, sandy clay, or clay. If mottles are present, they are few or common and are red, brown, and yellow. The B3 horizon is mottled red, yellowish red, reddish yellow, strong brown, brownish yellow, and yellowish brown. It is sandy clay loam or clay loam.

The C horizon is sandy loam, or it is soft saprolite that crushes easily to sandy loam or sandy clay loam.

Ashlar series

The Ashlar series consists of soils that are moderately deep to a lithic contact. These well drained to excessively drained soils formed in material weathered from granite and gneiss. Permeability is moderately rapid. The very gently sloping to steep Ashlar soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 45 percent.

The Ashlar soils are geographically closely associated with Appling, Pacolet, and Wedowee soils. The associated soils have an argillic horizon and do not have hard bedrock at a depth between 22 and 40 inches. In addition, Appling soils commonly are less sloping than the Ashlar soils.

Typical pedon of Ashlar sandy loam, in an area of Ashlar-Wedowee complex, 2 to 10 percent slopes, in an area of loblolly pine; 1.1 miles southwest of Rock Chapel School; 2.3 miles northeast of Redan School:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many very fine and fine roots, common medium roots; few fine flakes of mica; few pebbles; strongly acid; clear smooth boundary.
B2—8 to 24 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine roots, few very fine and large roots; few fine flakes of mica; few pebbles; strongly acid; clear irregular boundary.
C—24 to 31 inches; yellowish brown, strong brown, and gray weathered granite and gneiss; 20 percent, by volume, yellowish brown sandy loam and 5 percent, by volume, clay lenses in pockets, seams, and cracks; few fine roots; strongly acid; abrupt wavy boundary.
R—31 inches; hard granite rock.

The solum ranges from 14 to 27 inches in thickness. Depth to hard rock ranges from 22 to 40 inches. The soil is very strongly acid or strongly acid throughout except for the surface layer in areas that have been limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4; or it has hue of 2.5Y, value of 3 or 4, and chroma of 2 or 4. In some pedons, 3 to 15 percent of the surface is covered with stones, boulders, and outcrops of bedrock. If an A2 horizon is present, it is 4 to 8 inches thick.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4, 6, or 8.

The C horizon commonly is soft weathered soil material that has thin lenses of clay and pockets of sandy loam and coarse sandy loam.

Cartecay series

The Cartecay series consists of deep, somewhat poorly drained soils that formed in thick, loamy alluvial sediment. Permeability is moderately rapid. These nearly level soils are on flood plains within the Southern Piedmont. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet in winter and spring. Slope is 0 to 2 percent.

The Cartecay soils are geographically closely associated with Altavista, Toccoa, and Wehadkee soils. Altavista soils are on higher lying stream terraces than the Cartecay soils, are moderately well drained, and have an argillic horizon. Toccoa soils are on slightly higher areas and are well drained. Wehadkee soils are in slight depressions, are poorly drained, and have a fine-loamy control section.

Typical pedon of Cartecay silt loam, frequently flooded, in a wooded area; 1.42 miles south of Interstate

Highway 20; 2.25 miles north of Georgia Highway 212; 0.1 mile east of Pole Bridge Creek:

A1—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable; few medium roots; few fine flakes of mica; slightly acid; clear wavy boundary.
C1—8 to 16 inches; dark brown (7.5YR 4/4) loam; weak fine granular structure; very friable; few fine and medium roots; few fine flakes of mica; medium acid; gradual wavy boundary.
C2—16 to 28 inches; brown (10YR 5/3) sandy loam; many medium distinct dark brown (7.5YR 3/2) mottles and common fine faint light brownish gray mottles; massive; friable; few fine flakes of mica; few black concretions; common medium pores; medium acid; gradual wavy boundary.
C3—28 to 40 inches; pale brown (10YR 6/3) sandy loam; many medium distinct brown (7.5YR 5/4) and few medium faint light brownish gray (10YR 6/2) mottles; few fine flakes of mica; few fine and medium roots; medium acid; gradual wavy boundary.
C4g—40 to 55 inches; light gray (10YR 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/8) and few medium prominent yellowish red (5YR 4/6) mottles; friable; few fine and medium roots; few fine flakes of mica; few lenses of sandy clay loam; medium acid; gradual wavy boundary.
C5g—55 to 60 inches; light gray (10YR 6/1) sandy clay loam; common fine prominent yellowish brown mottles and few medium prominent yellowish red (5YR 4/6) mottles; massive; friable; few fine flakes of mica; few fine and medium roots, strongly acid.

This pedon is 60 inches or more in thickness. This soil is slightly acid to strongly acid throughout. However, some part of the profile between depths of 8 and 40 inches is medium acid or slightly acid.

The A horizon has hue of 5YR and 7.5YR, value of 4, and chroma of 4; or it has hue of 10YR, value of 3 to 5, and chroma of 3 or 4.

The C1, C2, and C3 horizons have a matrix hue of 5YR, value of 4 or 5, and chroma of 4 or 6; or they have hue of 7.5YR, value of 4, and chroma of 2 or 4; or hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4. The C4g and C5g horizons have a gray matrix or are mottled in gray, brown, and red.

Cecil series

The Cecil series consists of deep, well drained soils that formed in material weathered from granite, gneiss, and mica schist. Permeability is moderate. These very gently sloping to sloping soils are on uplands of the Southern Piedmont. Slope is 2 to 15 percent.

The Cecil soils are geographically closely associated with Appling, Gwinnett, Madison, and Pacolet soils. Appling soils have a predominantly yellowish brown subsoil. Gwinnett, Madison, and Pacolet soils have a thinner solum than the Cecil soils. In addition, Gwinnett soils are darker red throughout, and Madison soils formed in material weathered from rock high in mica.

Typical pedon of Cecil sandy loam, 2 to 6 percent slopes, on a ridgetop in an area of loblolly pine; 0.04 mile south of the Georgia Railroad; 1.7 miles north of Georgia Highway 10; 0.8 mile west of U.S. Highway 78:

Ap—0 to 6 inches; brown (7.5YR 4/4) sandy loam; weak fine granular structure; friable; common pebbles and few cobbles; many fine roots, few medium and large roots; strongly acid; abrupt smooth boundary.
B1—6 to 10 inches; red (2.5YR 4/6) sandy clay loam; weak fine subangular blocky structure; friable; common pebbles; few fine pores; common fine and medium roots; very strongly acid; clear wavy boundary.
B21t—10 to 28 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm; common pebbles; few fine pores; common fine and medium roots; clay films on faces of peds; very strongly acid; gradual wavy boundary.
B22t—28 to 40 inches; red (2.5YR 4/6) clay; few fine and medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine and medium roots; clay films on faces of peds; few pebbles; few fine flakes of mica; very strongly acid; gradual clear wavy boundary.
B3—40 to 51 inches; red (2.5YR 4/6) sandy clay loam; few medium and coarse distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm; few fine roots; clay films on some faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C—51 to 62 inches; red (2.5YR 4/6) weathered granite, gneiss, and mica schist that are firm in place but crush easily to loam if disturbed; massive; about 10 percent red clay in pockets; many fine flakes of mica; very strongly acid.

The solum ranges from 43 to 56 inches in thickness. The soil is strongly acid or very strongly acid except for the surface layer in areas that have been limed.

The A horizon has hue of 2.5YR, value of 4, and chroma of 6; or it has hue of 5YR, value of 4, and chroma of 3, 4, or 6; or hue of 7.5YR, value of 4 or 5, and chroma of 4; or it has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The A horizon is sandy loam or sandy clay loam.

If the B1 horizon is present, it has hue of 2.5YR or 5YR, value of 4, and chroma of 6 or 8. It is sandy clay loam or clay loam. The Bt horizon has hue of 10R or 2.5YR, value of 4, and chroma of 6 or 8. It is sandy clay or clay. In some pedons the Bt horizon has yellowish brown mottles. The B3 horizon has hue of 10R or 2.5YR,

value of 4, and chroma of 6 or 8. It is sandy clay loam or clay loam. In some pedons, the B3 horizon has yellowish brown mottles.

The C horizon is soft saprolite that crushes easily to loam or sandy loam.

Chestatee series

The Chestatee series consists of deep, well drained soils that formed in material weathered from hornblende gneiss, granite, and schist. Permeability is moderate. These strongly sloping and steep soils are on uplands of the Southern Piedmont. Slope is 15 to 45 percent.

The Chestatee soils are geographically closely associated with Ashlar, Gwinnett, Pacolet, and Wilkes soils. Ashlar and Wilkes soils have a yellowish brown subsoil and are more shallow to bedrock than the Chestatee soils. Gwinnett and Pacolet soils are less stony throughout.

Typical pedon of Chestatee stony sandy loam, 15 to 45 percent slopes, in an area of hardwoods; 0.45 mile north of the Clayton County line; 0.4 mile east of U.S. Highway 23:

A1—0 to 5 inches; dark grayish brown (10YR 4/2) stony sandy loam; weak fine granular structure; very friable; few fine flakes of mica; many fine and medium roots; 25 percent, by volume, pebbles, cobbles, and stones; strongly acid; clear smooth boundary.

B1—5 to 9 inches; yellowish red (5YR 4/8) stony clay loam; weak fine and medium subangular blocky structure; friable; few fine flakes of mica; many fine and medium roots; 15 percent, by volume, pebbles, cobbles, and stones; strongly acid; clear smooth boundary.

B21t—9 to 19 inches; red (2.5YR 4/8) stony clay; moderate medium subangular blocky structure; firm; many fine, few medium and large roots; few fine flakes of mica; thin patchy clay films on faces of peds; 25 percent, by volume, pebbles, cobbles, and stones; strongly acid; clear irregular boundary.

B22t—19 to 35 inches; red (2.5YR 4/8) stony clay; moderate medium subangular blocky structure; firm; few fine roots; few fine flakes of mica; clay films on faces of peds; 35 percent, by volume, cobbles and stones; strongly acid; abrupt irregular boundary.

C—35 to 62 inches; reddish yellow, strong brown, and yellowish red weathered hornblende gneiss, granite, and schist that crush to loam; 5 percent, by volume, red clay loam in pockets; strongly acid.

The solum ranges from 21 to 40 inches in thickness. Pebbles, cobbles, and stones cover 15 to 25 percent of the surface. Flakes of mica are few or common in the A and B horizons and, if present, few to many in the C horizon. The soil is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. Coarse fragments range from 15 to 25 percent, by volume.

The B1 horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or it has hue of 7.5YR, value of 5, and chroma of 6 or 8. It is stony sandy clay loam or stony clay loam. Coarse fragments range from 15 to 25 percent, by volume. The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8; or it has hue of 7.5YR, value of 5, and chroma of 6 or 8. It is stony clay loam or stony clay. Coarse fragments range from 15 to 35 percent, by volume.

The C horizon is soft granite, gneiss, schist, and diorite saprolite that crushes to sandy loam or loam.

Grover series

The Grover series consists of deep, well drained soils that formed in material weathered from mica schist and mica gneiss. Permeability is moderate. These gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 6 to 45 percent.

Grover soils are geographically closely associated with Madison, Pacolet, and Sweetapple soils. Madison and Pacolet soils are in a clayey family. Sweetapple soils are in a coarse-loamy family.

Typical pedon of Grover fine sandy loam, in an area of Sweetapple-Grover complex, 15 to 45 percent slopes, under hardwoods; 0.03 mile west of the South River; 0.6 mile south of Georgia Highway 155; 2 miles southeast of DeKalb Community College:

A1—0 to 5 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; common fine flakes of mica; few small fragments of schist; many fine and few medium roots; few dark brown wormcasts; strongly acid; clear smooth boundary.

B1—5 to 9 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few small fragments of schist; common fine flakes of mica; many fine and few medium roots; many fine pores; few fine root channels and wormholes filled with dark brown fine sandy loam; very strongly acid; clear smooth boundary.

B21t—9 to 15 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; many fine and few medium roots; thin patchy clay films on faces of peds; many fine flakes of mica; few small fragments of schist; common fine and medium pores; very strongly acid; clear smooth boundary.

B22t—15 to 29 inches; yellowish red (5YR 4/6) sandy clay loam; moderate medium subangular structure; friable; common fine roots; many fine flakes of mica; clay films on faces of peds; few small fragments of schist; few fine and medium pores; red coatings on surfaces of peds; very strongly acid; clear smooth boundary.

B3—29 to 34 inches; yellowish red (5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; many fine and medium flakes of mica; 15 percent small fragments of schist; very strongly acid; clear wavy boundary.
C—34 to 62 inches; very dark gray, weak red, dark brown, gray, and brown weathered mica schist and mica gneiss that crush to sandy loam; many fine and medium flakes of mica; very strongly acid.

The solum ranges from 30 to 38 inches in thickness. The soil is very strongly acid or strongly acid throughout except for the surface layer in areas that have been limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3; or it has hue of 7.5YR, value of 5, and chroma of 4 or 6. If the A1 horizon is present, it has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. If the A2 horizon is present, it has hue of 10YR, value of 6, and chroma of 3.

If the B1 horizon is present, it has hue of 5YR and 7.5YR, value of 5 or 6, and chroma of 6 or 8; or it has hue of 10YR, value of 5, and chroma of 8. It is sandy loam or sandy clay loam. The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or it has hue of 7.5YR and 10YR, value of 5, and chroma of 6 or 8. It is clay loam or sandy clay loam.

The C horizon commonly is soft weathered mica schist and mica gneiss that crush to sandy loam. Pockets or tongues of loamy material are in the cracks and seams among the rock fragments and make up 15 percent of some pedons.

Gwinnett series

The Gwinnett series consists of deep, well drained soils that formed in material weathered from diorite, gneiss, and schist. Permeability is moderate. These very gently sloping and gently sloping soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 30 percent.

The Gwinnett soils are geographically closely associated with Hiwassee, Madison, Musella, and Pacolet soils. Hiwassee soils have a thicker solum than the Gwinnett soils, and Musella soils have a thinner solum. Madison and Pacolet soils have mainly a red subsoil, and in addition Madison soils have more mica.

Typical pedon of Gwinnett sandy loam, 2 to 6 percent slopes, in an area of grass and loblolly pine; 2.2 miles west of the town of Klondike; 0.95 mile south of Georgia Highway 212; 0.3 mile north of the South River:

Ap—0 to 7 inches; dark reddish brown (5YR 3/4) sandy loam; weak fine granular structure; very friable; many fine and very fine roots; few fine pebbles; medium acid; abrupt smooth boundary.
B21t—7 to 20 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; many fine and very fine roots; few fine clear quartz pebbles; few soft yellowish brown rock fragments; few fine flakes of mica; clay films on faces of peds; strongly acid; gradual smooth boundary.
B22t—20 to 31 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; common fine and very fine roots; few fine clear quartz pebbles; soft yellowish brown rock fragments that are 5 percent, by volume; few fine flakes of mica; clay films on faces of peds; strongly acid; clear irregular boundary.
C—31 to 62 inches; yellowish brown and black weathered diorite, gneiss, and schist that have thin dark red clay lenses and tongues; massive; about 20 percent, by volume; lenses and tongues in discontinuous narrow bands or pockets 0.25 inch to 4 inches wide; strongly acid.

The solum ranges from 25 to 39 inches in thickness. The soil is strongly acid or medium acid throughout except for the surface layer in areas that have been limed.

The A horizon has hue of 2.5YR, value of 3, and chroma of 2, 4, or 6; or it has hue of 5YR, value of 3, and chroma of 2 or 4. It is sandy loam or sandy clay loam. Few to many pebbles and a few cobbles are in some pedons.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 6. If the B1 and B3 horizons are present, they are dark red sandy clay loam or clay loam.

The C horizon commonly is soft weathered saprolite that has lenses, pockets, or tongues of red or dark red clay or clay loam that make up about 5 to 25 percent, by volume, of many pedons.

Hiwassee series

The Hiwassee series consists of deep, well drained soils that formed in material weathered from diorite gneiss and hornblende gneiss. Permeability is moderate. These very gently sloping and gently sloping soils are on uplands of the Southern Piedmont. Slope is 2 to 10 percent.

The Hiwassee soils are geographically closely associated with Cecil and Gwinnett soils. Cecil soils have a red subsoil, and Gwinnett soils have a thinner solum than the Hiwassee soils.

Typical pedon of Hiwassee sandy loam, 6 to 10 percent slopes, in an area of grass and loblolly pine; 0.6 mile south of the town of Klondike and Georgia Highway 212; 0.4 mile north of the South River; 1.4 miles west of the Rockdale County line:

Ap—0 to 7 inches; dark reddish brown (2.5YR 3/4) sandy loam; weak fine granular structure; friable; many fine and few medium roots; few fine flakes of mica; few black concretions; few yellowish brown pebbles; medium acid; clear smooth boundary.

B21t—7 to 23 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; many fine roots; few fine flakes of mica; few clear quartz pebbles; few small yellowish brown rock fragments; few black concretions; clay films on faces of peds; medium acid; clear smooth boundary.
B22t—23 to 42 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; common fine roots; clay films on faces of peds; few dark brown concretions; few fine flakes of mica; few clear quartz pebbles; strongly acid; gradual wavy boundary.
B3—42 to 52 inches; dark red (2.5YR 3/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; thin discontinuous clay films on faces of peds; few clear quartz pebbles; few dark brown concretions; few small yellowish brown rock fragments; strongly acid; abrupt smooth boundary.
C—52 to 63 inches; dark red, yellowish brown, and red soft weathered diorite gneiss and hornblende gneiss that crush to sandy loam; strongly acid.

The solum ranges from 40 to 63 inches or more in thickness. The soil is strongly acid or medium acid throughout except for the surface layer in limed areas.

The A horizon has hue of 10R and 5YR, value of 3, and chroma of 2 to 4; or it has hue of 10R, value of 3, and chroma of 6; or hue of 2.5YR, value or 3, and chroma of 2, 4, or 6. The A horizon is sandy loam or clay loam.

The Bt horizon has hue of 10R, value of 3, and chroma of 3, 4, or 6; or it has hue of 2.5YR, value of 3, and chroma of 4 or 6. The B3 horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 6 or 8.

The C horizon commonly is soft saprolite that crushes to sandy loam or loam.

Iredell series

The Iredell series consists of deep, moderately well drained or somewhat poorly drained soils that formed in material weathered from diorite and other basic rock. Permeability is slow. These very gently sloping and gently sloping soils are on uplands of the Southern Piedmont. Slope is 2 to 10 percent.

The Iredell soils are geographically closely associated with Chestatee, Gwinnett, and Wilkes soils. Chestatee and Gwinnett soils are well drained and have a red or dark red subsoil that is less plastic than the Iredell soils. Wilkes soils are well drained and are more shallow to bedrock.

Typical pedon of Iredell fine sandy loam, 2 to 10 percent slopes, in a wooded area; 0.87 mile southwest of the intersection of Interstate Highway 285 and U.S. Highway 23; 0.64 mile southwest of the intersection of U.S. Highway 23 and Georgia Highway 160:

A1—0 to 6 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; friable; many fine roots; few pebbles; few fine concretions; slightly acid; clear smooth boundary.
A2—6 to 10 inches; light brownish gray (2.5Y 6/2) fine sandy loam; weak fine granular structure; friable; many fine roots; few fine concretions; few pebbles; few wormholes and root channels filled with dark grayish brown material; many wormcasts; medium acid; clear smooth boundary.
B1—10 to 14 inches; light olive brown (2.5Y 5/6) sandy clay loam; few fine faint olive brown mottles; weak medium subangular blocky structure; friable; few fine roots; few fine strong brown concretions; few pebbles; medium acid; clear smooth boundary.
B2t—14 to 23 inches; light olive brown (2.5Y 5/6) clay; few fine prominent yellowish red mottles; moderate medium angular blocky structure; firm; few fine roots; continuous clay films on faces of peds; few fine black and brown concretions; slightly acid; clear wavy boundary.
B3—23 to 27 inches; mottled strong brown (7.5YR 5/6) and gray (10YR 6/1) clay; weak fine and medium subangular blocky structure; firm; few fine roots; clay films on faces of peds; about 40 percent, by volume, pale yellow and dark olive gray soft rock; slightly acid; clear irregular boundary.
C1—27 to 44 inches; mottled greenish gray, dark olive gray, pale yellow, and reddish yellow weathered diorite and other basic rock that crush to sandy loam; massive; friable; few fine roots; about 5 percent, by volume, grayish brown clay in pockets and along cleavage planes; neutral; gradual wavy boundary.
Cr—44 to 65 inches; greenish gray, pale yellow, dark olive gray, and yellowish brown soft bedrock; neutral.

The solum ranges from 23 to 38 inches in thickness. The soil is medium acid or slightly acid in the A and B1 horizons; slightly acid or neutral in the B2t and B3 horizons; and neutral in the C horizon. In places, a few pebbles are present in the A and B1 horizons.

The A1 horizon has hue of 10YR; value of 4 or 5, and chroma of 2 to 4; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2 or 4. Commonly, a few cobbles and stones are on the surface. The A2 horizon has hue of 2.5Y, value of 6 or 7, and chroma of 2. It is fine sandy loam or sandy loam.

The B1 horizon has hue of 5Y or 10YR, value of 4 or 5, and chroma of 3 or 4; or it has hue of 5Y or 10YR, value of 5, and chroma of 6; or hue of 2.5Y, value of 4 or 5, and chroma of 4 or 6. Mottles are in some pedons. The B1 horizon is sandy loam, sandy clay loam, or clay loam. The B2t horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 4 or 6. Mottles are in some pedons. The B3 horizon is mottled and has hue of 2.5Y, value of 5, and chroma of 4 or 6; or it has hue of 2.5Y,

value of 4, and chroma of 4; or hue of 10YR, value of 4 or 5, and chroma of 2 to 4; or hue of 10YR, value of 5, and chroma of 6. It is sandy clay loam or clay loam.

The Cr horizon commonly is saprolite or soft weathered bedrock. It is 5 to 10 percent, by volume, lenses, pockets, or tongues of brown or olive clay.

The Iredell soils mapped in DeKalb County are taxadjuncts to the Iredell series because they have a B1 horizon that is 3 to 5 inches thick. This is outside the range of the Iredell series. The difference, however, does not significantly affect the use and management of these soils.

Madison series

The Madison series consists of deep, well drained soils that formed in material weathered from mica schist or mica gneiss. Permeability is moderate. These very gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 30 percent.

The Madison soils are geographically closely associated with Gwinnett, Musella, Pacolet, and Sweetapple soils. Gwinnett and Musella soils have a dark red subsoil and have less mica than the Madison soils. In addition, Musella soils have a thinner solum. Pacolet soils have a lower content of mica, and Sweetapple soils do not have an argillic horizon.

Typical pedon of Madison sandy loam, 6 to 10 percent slopes, in an area of loblolly pine; 0.75 mile east of the County Line School; 0.5 mile north of Clarks Creek; 1 mile south of the South River:

Ap—0 to 6 inches; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; friable; common fine and medium flakes of mica; common pebbles, about 5 percent by volume; many fine and few medium and large roots; few lenses of red sandy clay loam; strongly acid; abrupt wavy boundary.

B1—6 to 9 inches; red (2.5YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable; few pebbles and fragments of schist; many fine flakes of mica; common fine and medium roots; few fine root channels and wormholes filled with dark brown sandy loam; strongly acid; clear broken boundary.

B2t—9 to 21 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; common fine and medium roots; clay films on faces of peds; many fine flakes of mica; few pebbles and fragments of schist; strongly acid; gradual wavy boundary.

B3—21 to 28 inches; red (2.5YR 4/6) clay loam; friable; few fine roots; many fine and medium flakes of mica; few thin clay films on fragments of schist; few pebbles and many fragments of schist; strongly acid; clear wavy boundary.

C1—28 to 46 inches; brown, weak red, gray, and dark yellowish brown weathered mica schist and mica gneiss that crush to sandy loam; friable; pockets of red clayey material; massive; few fine roots; many fine and medium flakes of mica; few thin clay films on fragments of schist; strongly acid; clear wavy boundary.

C2—46 to 54 inches; weak red, strong brown, and very pale brown weathered mica schist and mica gneiss that crush to sandy loam; friable; massive; many fine and coarse flakes of mica; few fine roots; strongly acid; clear wavy boundary.

C3—54 to 62 inches; white, gray, weak red, and yellowish red weathered mica schist and mica gneiss that crush to sandy loam; friable; massive; many fine, medium, and coarse flakes of mica; strongly acid.

The solum ranges from 21 to 40 inches in thickness. The soil is very strongly acid or strongly acid throughout except for the surface layer in areas that have been limed.

The Ap horizon has hue of 5YR, value of 4 or 5, and chroma of 4 or 6; or hue of 7.5YR, value of 5, and chroma of 4 or 6; or it has hue of 7.5YR, and value and chroma of 4. It is sandy loam or sandy clay loam. If an A1 horizon is present, it has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. If an A2 horizon is present, it has hue of 10YR, value of 4, and chroma of 3 or 4; or it has hue of 7.5YR, and value and chroma of 4.

The B1 horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam or clay loam. The Bt horizon has hue of 10R, 2.5YR, or 5YR; value of 4 or 5; and chroma of 6 or 8. It is clay or clay loam. The B3 horizon is sandy clay loam or clay loam. It has hue of 2.5YR, value of 4, and chroma of 6 or 8.

The C horizon commonly is soft schist saprolite that crushes to sandy loam. Lenses, pockets, or tongues of clay or clay loam commonly make up 1 to 15 percent of this horizon.

Musella series

The Musella series consists of soils that are shallow to a paralithic contact. These well-drained soils formed in material weathered from hornblende gneiss, granite, and schist. Permeability is moderate. These gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 6 to 45 percent.

The Musella soils are geographically closely associated with Gwinnett, Madison, and Pacolet soils. All of the associated soils have a thicker solum than Musella soils. In addition, Madison and Pacolet soils have a red subsoil, and Madison soils have a high content of mica.

Typical pedon of Musella stony sandy clay loam, 15 to 45 percent slopes, in an area of hardwoods; 0.75 mile south of the Stone Mountain Airport; 0.18 mile north of Stone Mountain Creek; 0.8 mile southwest of the Gwinnett County line:

A1—0 to 5 inches; dark reddish brown (5YR 3/4) stony sandy clay loam; weak fine granular structure; friable; cobbles and stones cover 5 percent of the surface; many fine and medium roots; common fine flakes of mica; strongly acid; clear smooth boundary.
B2t—5 to 16 inches; dark red (2.5YR 3/6) gravelly clay loam; moderate medium subangular blocky structure; friable; many fine and medium roots; common fine flakes of mica; thin clay films on faces of peds; 25 percent pebbles and cobbles that are yellowish brown and yellowish red; medium acid; clear smooth boundary.
B3—16 to 19 inches; dark red (2.5YR 3/6) very gravelly clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; 40 percent pebbles and cobbles that are yellowish brown and yellowish red; common fine flakes of mica; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.
Cr—19 to 65 inches; weathered and broken hornblende gneiss, granite, and schist that is red, yellowish red, and yellowish brown; 5 percent dark red clay loam in seams and tongues among rock fragments; few fine roots in cracks and seams that are more than 4 inches apart; medium acid.

The thickness of the solum and depth to the Cr horizon range from 15 to 20 inches. The soil is strongly acid or medium acid. If pebbles and concretions are present, they range from few to many in the A and B horizons. If flakes of mica are present, they are few or common in the A and B horizons and range from few to many in the C horizon.

The A horizon has hue of 5YR and 10R, value of 3, and chroma of 3 or 4; or it has hue of 2.5YR, value of 3, and chroma of 4; or hue of 7.5YR, value of 3, and chroma of 2. The A horizon is clay loam or stony sandy clay loam.

The B horizon has hue of 2.5YR or 10R, value of 3, and chroma of 4 or 6. It is gravelly clay loam, clay loam, or clay and commonly has few to many brownish yellow, yellowish brown, reddish yellow, and strong brown soft rock fragments. Some pedons do not have a B3 horizon.

The Cr horizon commonly is soft coherent saprolite that is red, brown, yellow, gray, and black. It commonly crushes to gravelly loam, sandy loam, or loam. In places in the Cr horizon, dark red or red loamy material is in tongues, cracks, and seams among the rock fragments. If present, this material makes up 5 to 25 percent of the horizon.

Pacolet series

The Pacolet series consists of deep, well drained soils that formed in material weathered from granite, gneiss, and mica schist. Permeability is moderate. These very gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 30 percent.

The Pacolet soils are geographically closely associated with Appling, Ashlar, Cecil, and Madison soils. Appling soils have a predominantly yellowish brown subsoil that is thicker than that of the Pacolet soils. Ashlar soils have less clay in the subsoil and have hard rock at a depth of about 2 to 3 feet. Cecil soils have a thicker solum. Madison soils have more mica throughout.

Typical pedon of Pacolet sandy loam, 2 to 10 percent slopes, in an area of pine trees; 1.75 miles northwest of the Lithonia High School; 1 mile north of U.S. Highway 278; 1 mile southeast of the Redan School:

Ap—0 to 5 inches; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and medium roots; few fine pores; common quartz pebbles, 5 percent by volume; strongly acid; abrupt smooth boundary.
B1—5 to 10 inches; yellowish red (5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; common fine and few medium roots; few fine pores; few small wormholes and root channels filled with dark brown sandy loam; few quartz pebbles; strongly acid; clear smooth boundary.
B21t—10 to 18 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; common fine and few medium roots; few wormcasts; clay films on faces of some peds; few fine flakes of mica; few quartz pebbles; strongly acid; gradual smooth boundary.
B22—18 to 26 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; prominent clay films on faces of peds; few fine roots; few quartz pebbles; few fine flakes of mica; very strongly acid; clear wavy boundary.
B3—26 to 36 inches; red (2.5YR 4/6) sandy clay loam; few fine distinct yellowish brown and strong brown mottles; weak medium and coarse subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.
C1—36 to 46 inches; yellowish red, yellowish brown, and strong brown weathered granite, gneiss, and mica schist that crush to sandy loam; few red sandy clay loam lenses 1 inch to 3 inches wide; massive; friable; very strongly acid; clear wavy boundary.
C2—46 to 58 inches; yellowish red, yellowish brown, and strong brown weathered granite, gneiss, and mica schist that are firm in place; crushes to sandy loam; few red sandy clay loam lenses 1 inch to 2 inches wide; massive; very strongly acid; abrupt wavy boundary.
C3—58 to 66 inches; micaceous weak red, red, and yellowish brown weathered granite, gneiss, and mica schist that are friable; massive; very strongly acid.

The solum ranges from 22 to 38 inches in thickness. The soil is strongly acid or very strongly acid throughout except for the surface layer in areas that have been limed.

The A horizon has hue of 5YR and 10YR, value of 3 to 5, and chroma of 2 to 4; or it has hue of 7.5YR, value of 4 or 5, and chroma of 2 or 4; or hue of 7.5YR, value of 3, and chroma of 2. It is sandy loam or sandy clay loam.

The B1 horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The B2t horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay loam or clay. The B3 horizon has hue of 10R, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. It has few or common yellowish brown and strong brown mottles in most pedons. The B3 horizon is sandy clay loam or clay loam.

The C horizon commonly is soft weathered saprolite that crushes to loam, sandy loam, or fine sandy loam. Some pedons have thin lenses, pockets, or tongues of red clay or clay loam in the saprolite.

Sweetapple series

The Sweetapple series consists of soils that are moderately deep and deep to a paralithic contact. These somewhat excessively drained soils formed in material weathered from mica schist, quartz mica schist, granite, and gneiss. Permeability is moderately rapid. These gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 6 to 45 percent.

The Sweetapple soils are geographically closely associated with Grover, Gwinnett, Madison, and Pacolet soils. The associated soils are in a clayey or fine-loamy family.

Typical pedon of Sweetapple fine sandy loam, in an area of Sweetapple-Grover complex, 15 to 45 percent slopes, in a woodland of white oak, red oak, poplar, and hickory that has an understory of dogwood, sourwood, and maple; 0.03 mile west of the South River; 0.6 mile south of Georgia Highway 155; 2 miles southeast of DeKalb Community College:

A1—0 to 4 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; friable; common fine roots; few very dark grayish brown wormcasts; 5 percent soft fragments of schist; few fine and medium pores; many fine flakes of mica; strongly acid; clear smooth boundary.

B1—4 to 8 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; many fine and few medium roots; 10 percent soft fragments of schist; few fine and medium pores; many fine and medium flakes of mica; medium acid; clear smooth boundary.

B2—8 to 20 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium angular blocky structure; friable; common fine roots; few fine and medium pores; 15 percent soft fragments of schist; many fine flakes of mica; strongly acid; clear wavy boundary.

B3—20 to 26 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium angular blocky structure; friable; few fine roots; 25 percent soft fragments of schist; many fine flakes of mica; few fine and medium pores; strongly acid; abrupt irregular boundary.

Cr—26 to 60 inches; weathered reddish yellow, grayish brown, gray, and very dark grayish brown mica schist and mica gneiss that crush to sandy loam; 5 percent sandy loam in pockets; strongly acid.

The solum ranges from 15 to 30 inches in thickness. Depth to the Cr horizon ranges from 24 to 45 inches. Depth to hard bedrock is more than 60 inches. The soil is very strongly acid to medium acid. Pebbles and fragments of schist range from 5 to 20 percent in the A and B horizons. Flakes of mica are common or many throughout. The B1 and B3 horizons are present in most pedons.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4 or 6; or it has hue of 7.5YR, value of 3 to 5, and chroma of 2, 4, or 6.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is fine sandy loam, sandy loam, loam, or gravelly sandy loam.

If the C horizon is present, it is soft weathered mica schist and mica gneiss that crush to sandy loam or fine sandy loam. It has pockets or tongues of fine sandy loam or sandy loam that make up 5 to 15 percent of the horizon. The Cr horizon is soft weathered mica schist and mica gneiss that is broken and fractured. An occasional dike of hard rock is in some pedons.

Toccoa series

The Toccoa series consists of deep, well drained soils that formed in predominantly loamy sediment. Permeability is moderately rapid. These nearly level and very gently sloping soils are on flood plains, in depressions, near heads of drainageways, and at the base of slopes within the Southern Piedmont. The seasonal high water table is at a depth of 2.5 to 5 feet in winter and spring. Slope is 0 to 4 percent.

The Toccoa soils are geographically closely associated with Altavista, Cartecay, and Wehadkee soils. Altavista soils are on stream terraces and have an argillic horizon. They are moderately well drained. Cartecay soils and Wehadkee soils are in somewhat lower lying positions. Cartecay soils are somewhat poorly drained, and Wehadkee soils are poorly drained. In addition, Wehadkee soils have a fine-loamy control section.

Typical pedon of Toccoa sandy loam, frequently flooded, in a wooded area; 0.67 mile east of Georgia Highway 155; 0.04 mile north of the South River; 1.15 miles south of Georgia Highway 212:

A11—0 to 8 inches; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many very fine roots; many fine flakes of mica; medium acid; clear smooth boundary.

A12—8 to 12 inches; reddish brown (5YR 4/4) sandy loam; weak fine granular structure; very friable; common fine roots; many fine flakes of mica; medium acid; gradual wavy boundary.
C1—12 to 34 inches; reddish brown (5YR 4/4) sandy loam; massive; very friable; few fine and medium roots; bedding planes are loamy sand 1 centimeter to 3 centimeters thick and are about 6 inches apart; few fine flakes of mica; medium acid; abrupt smooth boundary.
C2—34 to 62 inches; dark brown (10YR 4/3) sandy loam; massive; very friable; few medium roots; few fine flakes of mica; medium acid.

This pedon is 60 inches or more in thickness. This soil is strongly acid to slightly acid throughout. However, some part of the profile between depths of 8 and 40 inches is medium acid or slightly acid.

The A horizon has hue of 10YR, value of 3, and chroma of 2; or it has hue of 10YR, value of 4, and chroma of 2 to 4; or value of 5 and chroma of 3 or 4; or it has hue of 7.5YR, value of 4, and chroma of 4; or hue of 5YR, value of 3, and chroma of 3; or value of 3 to 5, and chroma of 4.

The C horizon has matrix colors similar to those of the A horizon. Some pedons have few or common gray, grayish brown, or light brownish gray mottles below a depth of 20 inches. The C horizon is dominantly sandy loam, but thin layers of loamy sand, loam, fine sandy loam, or sand are common. In a few places, sandy clay loam is at a depth of 45 inches.

Wedowee series

The Wedowee series consists of deep, well drained soils that formed in material weathered from schist, gneiss, and granite. Permeability is moderate. These very gently sloping to strongly sloping soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 25 percent.

The Wedowee soils are geographically closely associated with Appling, Ashlar, and Pacolet soils. Appling soils have a thicker solum than the Wedowee soils. Ashlar soils have hard bedrock between a depth of 22 and 40 inches. Pacolet soils have a predominantly red subsoil.

Typical pedon of Wedowee sandy loam, 2 to 6 percent slopes, in a pasture; 0.1 mile east of Georgia Highway 124 and 0.8 mile northeast of the Bruce School:

Ap—0 to 5 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine and very fine roots; strongly acid; abrupt smooth boundary.
A2—5 to 11 inches; brownish yellow (10YR 6/6) sandy loam; weak fine granular structure; very friable; many fine and very fine roots; few fine and very fine pores; strongly acid; clear smooth boundary.
B1—11 to 15 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium angular blocky structure; friable; common fine and very fine roots; few fine and very fine pores; thin clay films on faces of some peds; strongly acid; clear smooth boundary.
B2t—15 to 27 inches; yellowish brown (10YR 5/6) clay; common medium distinct yellowish red (5YR 4/6) and brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; firm; common fine and very fine roots; few fine pores; thick clay films on faces of most peds; 5 percent, by volume, soft rock fragments; strongly acid; clear wavy boundary.
B3—27 to 39 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct yellowish red mottles; moderate fine subangular blocky structure; friable; few fine roots; about 10 percent, by volume, lenses of red sandy loam 0.25 inch to 1.5 inches thick; very strongly acid; clear wavy boundary.
C—39 to 75 inches; red, white, yellowish brown, and pale yellow weathered schist, granite, and gneiss that crush to sandy loam; about 1 percent, by volume, thin clay lenses; very strongly acid.

The solum ranges from 24 to 40 inches in thickness. The soil is very strongly acid or strongly acid throughout except for the surface layer in areas that have been limed.

The Ap and A2 horizons have hue of 10YR; value of 4 to 6; and chroma of 3, 4, or 6.

If the B1 horizon is present, it has hue of 5YR, 7.5YR, or 10YR; value of 5 or 6; and chroma of 6 or 8. The B1 horizon is dominantly sandy clay loam but includes loam. Common strong brown mottles are in some pedons. The Bt horizon has hue of 5 YR, 7.5YR, or 10YR; value of 5 or 6; and chroma of 6 or 8. If mottles are present they are red, brown, and yellow and range from few to many. The Bt horizon is predominantly clay but includes sandy clay and clay loam. The B3 horizon has hue of 5YR, 7.5YR, or 10YR; value of 5; and chroma of 6 or 8. The B3 horizon is dominantly sandy clay loam but includes clay loam. If mottles are present, they are red, brown, and yellow and range from few to many.

The C horizon commonly is soft saprolite that crushes to sandy loam but ranges to sandy clay loam. In most pedons, pockets, tongues, or lenses of clayey material make up 1 to 10 percent of the horizon, by volume.

Wehadkee series

The Wehadkee series consists of deep, poorly drained soils that formed in thick, loam alluvial sediment. Permeability is moderate. These nearly level soils are in slight depressions on flood plains within the Southern Piedmont. The seasonal high water table is at the surface or to a depth of 2.5 feet from late in fall to early in summer. Slope is 0 to 2 percent.

The Wehadkee soils are geographically closely associated with Cartecay and Toccoa soils. Cartecay

soils are somewhat poorly drained, and Toccoa soils are well drained. They are on somewhat higher lying flood plains and have less clay throughout than the Wehadkee soils.

Typical pedon of Wehadkee silt loam, frequently flooded, in a wooded area; 100 feet west of Stephenson Creek; 0.85 mile northeast of Georgia Highway 212 and Pole Bridge Creek; 0.52 mile northwest of the Murphy Chandler School:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; many fine roots; few fine flakes of mica; medium acid; gradual wavy boundary.
B1g—8 to 20 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few fine flakes of mica; medium acid; gradual wavy boundary.
B2g—20 to 43 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown mottles; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; slightly acid; clear wavy boundary.
Cg—43 to 62 inches; gray (N 5/0) loam; few fine distinct yellowish brown mottles; massive; friable; few fine flakes of mica; medium acid.

The solum ranges from 42 to 52 inches in thickness. The soil is slightly acid or medium acid throughout.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 2; or it has hue of 10YR, value of 5, and chroma of 3; or hue of 2.5Y, value of 5 or 6, and chroma of 2. If present, brownish mottles are few or common.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 1; or it is neutral and has value of 4 or 5. Brownish mottles are few or common. The B horizon commonly is silty clay loam, but it is sandy clay loam in some pedons.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1; or it has hue of 10YR, value of 6, and chroma of 2; or it is neutral and has value of 5; or it has hue of 2.5Y, value of 6, and chroma of 2. The C horizon commonly is loam, but in some pedons it is sandy loam or gravelly sandy loam.

Wilkes series

The Wilkes series consists of soils that are moderately deep to a paralithic contact. These well drained soils formed in material weathered from hornblende gneiss, granite, and schist rock. Permeability is moderately slow. These very gently sloping to steep soils are on uplands of the Southern Piedmont. Slope ranges from 2 to 45 percent.

The Wilkes soils are geographically closely associated with Chestatee, Gwinnett, Iredell, and Pacolet soils. The associated soils have a thicker solum than Wilkes soils. In addition, Chestatee, Gwinnett, and Pacolet soils have a red or dark red subsoil. Iredell soils are not so well drained and are deeper to bedrock.

Typical pedon of Wilkes sandy loam, 2 to 10 percent slopes, in an area of loblolly and shortleaf pine; 0.63 mile southeast of the Cedar Grove High School and 1.25 miles southwest of the DeKalb Community College south campus:

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) sandy loam; weak fine granular structure; very friable; few wormcasts of pale olive; many fine and medium roots; common fine pebbles; strongly acid; abrupt smooth boundary.
B1—7 to 10 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few small wormholes and root channels filled with yellowish brown sandy loam; many fine and medium roots; few fine pores; common fine pebbles; medium acid; clear smooth boundary.
B2t—10 to 16 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate coarse and medium subangular blocky structure; firm; common fine roots; few fine pores; few fine flakes of mica; thin clay films on faces of peds; few small red and black concretions; medium acid; clear wavy boundary.
C1—16 to 28 inches; yellowish brown, yellow, and light gray weathered hornblende gneiss, granite, and schist that crushes easily to sandy loam; massive; few fine and medium roots; many fine flakes of mica; 10 percent, by volume, thin bands of strong brown and light olive gray clay; neutral; clear wavy boundary.
Cr—28 to 40 inches; light gray, pale olive, and strong brown soft bedrock; neutral; clear smooth boundary.
R—40 inches; hard bedrock.

The solum ranges from 10 to 23 inches in thickness. The soil is strongly acid or medium acid in the A horizon, strongly acid to neutral in the B horizon, and slightly acid or neutral in the C horizon. If pebbles and concretions are present, they range from few to many in the A and B horizons. If flakes of mica are present, they are few or common in the A and B horizons and few to many in the C horizon. Depth to hard bedrock commonly is at a depth of 40 to 60 inches or more.

The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4, or value of 3, and chroma of 2 and 3; or it has hue of 10YR, value of 6, and chroma of 3; or hue of 2.5Y, value of 3 to 5, and chroma of 2. The A1 horizon is sandy loam or stony sandy loam. An A2 horizon that is sandy loam or gravelly sandy loam is present in some pedons.

The B2t horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; or it has hue of 10YR, value of 5 or 6, and chroma of 4, 6, or 8; or hue of 10YR, and value and chroma of 4; or it has hue of 2.5Y, value of 4 to 6, and chroma of 4; or hue of 2.5Y, value of 5, and chroma of

6. Some pedons have a few or common olive, light olive brown, brownish yellow, yellowish brown, brown, reddish brown, and red mottles. The B2t horizon is sandy clay loam, clay loam, or clay. If the B3 horizon is present, it has few or common olive, yellowish brown, strong brown, and red mottles.

The C horizon commonly is saprolite and soft weathered rock that crushes to sandy loam or loam. Lenses, pockets, or tongues of brown or olive clay commonly make up some part of the C horizon.

The Wilkes soils mapped in DeKalb County are taxadjuncts to the Wilkes series because depth to the paralithic contact is slightly deeper than is defined for the Wilkes series, and the stony map units have a clayey subsoil. Use, management, and behavior, however, are similar to the Wilkes series.

Worsham series

The Worsham series consists of deep, poorly drained soils that formed in material weathered from granite and gneiss. Permeability is moderately slow to very slow. These very gently sloping soils are within the Southern Piedmont at the base of hillsides, in depressions, and at the upper ends of drainageways. The seasonal high water table is at the surface or ranges to a depth of 1 foot from late in fall to spring. Slope is 2 to 6 percent.

The Worsham soils are geographically closely associated with Appling, Ashlar, and Wedowee soils. The associated soils are on higher lying uplands and are well drained.

Typical pedon of Worsham sandy loam, 2 to 6 percent slopes, in an area of loblolly pine and sweetgum; 1.5 miles east of Pole Bridge Creek and 1.05 miles south of Interstate Highway 20:

A1—0 to 5 inches; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

A2—5 to 12 inches; gray (10YR 6/1) sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; very friable; common fine roots; strongly acid; gradual wavy boundary.

B1g—12 to 19 inches; light gray (10YR 7/1) sandy clay loam; common fine distinct brownish yellow mottles; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

B2tg—19 to 41 inches; light gray (N 7/0) sandy clay loam; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm, slightly sticky; few fine roots; thin clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

B3g—41 to 56 inches; light gray (N 7/0) sandy clay loam; weak medium subangular blocky structure; firm, sticky; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—56 to 60 inches; light gray (N 7/0) sandy loam; massive; friable, slightly sticky; common fine flakes of mica; very strongly acid.

The solum ranges from 42 to 60 inches in thickness. The soil is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 3. A few pebbles are present in some pedons.

The B1g horizon has hue of 10YR, value of 6 or 7, and chroma of 1. It has few or common light olive brown, brownish yellow, or yellowish red mottles. The B1g horizon is sandy loam or sandy clay loam. The Btg horizon has hue of 10YR, value of 6 or 7, and chroma of 1; or it is neutral and has value of 6 or 7. Flakes of mica are few or common. The Btg horizon has common or many light olive brown, light yellowish brown, or brownish yellow mottles. The B3g horizon has matrix color similar to that of the Btg horizon. If mottles are present, they are few or common and light yellowish brown, light olive brown, or light brownish gray. The B3g horizon is sandy clay loam or clay loam.

The C horizon has matrix color similar to that of the Btg horizon. If mottles are present, they are few or common and brownish yellow. If flakes of mica are present, they are few or common.

The Worsham soils mapped in DeKalb County are taxadjuncts to the Worsham series because the clay content of the control section is slightly less than that defined for the Worsham series. This variation, however, does not significantly affect the use and management of the soils.

formation of the soils

This section discusses the factors of soil formation and relates them to soils in the survey area. It also explains the processes of soil formation.

Soils are formed when parent material, plants and animals, climate, and topography, or relief, interact for long periods of time (*5*). This combination of factors largely determines the properties of the soil at any given point on the earth. These factors have influenced the formation of each soil in DeKalb County.

Climate and vegetation are the principal active forces that gradually alter the parent material to form a soil. Topography mainly affects soil drainage and runoff, but it also affects soil temperature. Therefore, climate, vegetation, and topography act over long periods of time to bring about changes in parent material. The five factors of soil formation are discussed separately in the paragraphs that follow.

parent material

Parent material is the unconsolidated mass in which soil forms. It is largely responsible for the chemical and mineralogical composition of a soil. DeKalb County is underlain by crystalline rock of mainly mica schist, intermediate gneiss, and granite gneiss (*3*).

Grover, Madison, and Sweetapple soils are micaceous throughout and are examples of soils that formed in parent material weathered from mica schist.

Appling, Cecil, Pacolet, and Wedowee soils are examples of soils that have a red or yellowish brown subsoil which formed in parent material weathered from intermediate gneiss or granite gneiss.

Gwinnett, Hiwassee, and Musella soils are examples of soils that have a dark red subsoil formed in parent material weathered from hornblende gneiss of the intermediate gneiss rock.

Iredell and Wilkes soils are examples of soils that have a firm, sticky and plastic subsoil and weathered in parent material from ultramafic rocks.

Stream alluvium is adjacent to all the streams in the survey area. The soils formed in loamy sediment transported from the upland. Poorly drained Wehadkee soils, somewhat poorly drained Cartecay soils, and moderately well drained and well drained Toccoa soils are examples of soils formed in alluvium.

relief

Relief implies relative elevation and is defined as the elevation or inequalities of a land surface considered collectively (*6*). Color of the soil, depth of the solum, wetness, soil temperature, erosion, thickness and content of organic matter of the A horizon, and plant cover are features commonly thought to be influenced by relief. In DeKalb County, the factors obviously related to relief are color, thickness of the solum, and wetness.

Cecil and Pacolet soils have a red subsoil; Worsham soils have a gray matrix throughout the B horizon. This color difference is attributed to a difference in relief and a corresponding difference in internal drainage. Cecil and Pacolet soils are higher lying and better drained than Worsham soils. This results in better oxidization and a subsoil that is red.

Very gently sloping Cecil soils on ridgetops have a thicker solum than moderately steep Wedowee soils on hillsides. This difference in thickness can be attributed to slow geologic erosion of the surface layer on gently sloping soils and to rapid geologic erosion on steep soils.

The movement of water across the surface and through the soil profile is controlled to a large extent by relief. Therefore, the degree of soil wetness is related to relief. Moving water commonly carries solid particles and causes erosion or deposition depending on the kind of relief. In sloping areas, runoff is more rapid and less water enters the soil, so the areas are drier. As a result of runoff and the lateral movement of water through the soil, lower lying areas are commonly wetter. Well drained Cecil soils on uplands characteristically are red and have few if any mottles. Poorly drained Worsham soils are at the base of hillsides and in depressions. These soils have a seasonal high water table, are characteristically gray throughout, and are mottled.

plants and animals

The role of plants, animals, and other organisms is significant in soil development, but the direct impact of each is difficult to measure in a soil. Some of the changes caused by plants and animals are gains in organic matter and nitrogen, gains or loss of plant nutrients, and changes in soil structure and porosity.

The soils of DeKalb County formed under a succession of plants. Deciduous trees are the climax

vegetation that has contributed significantly toward the recycling of plant nutrients, the accumulation of organic matter, and the energy for animal life. Plants reduce erosion by providing cover, and they stabilize the surface of the soil, enabling the soil-forming processes to continue. Plants provide a more stable environment for the soil-forming processes because they reduce the temperature extremes to which unprotected soils are subjected.

Animal life in the soils is abundant under the present vegetation and environment. Ants, bees, wasps, earthworms, and spiders, by making channels in the soil, and rodents, moles, crustacea, reptiles, and foxes, by making burrows, mix the soil in the upper horizons. Bacteria, fungi, and other micro-organisms hasten decomposition of organic matter and increase the release of minerals for additional plant growth. Man affects the soil-forming process by tilling the soils, smoothing hills, filling valleys, and reducing or increasing soil fertility.

The net gains and losses caused by plants and animals in the soil-forming process are important in DeKalb County. However, within the relatively small confines of the survey area, one soil is not significantly different from another soil because of plants and animals.

climate

The most important measured features of climate related to soil properties are rainfall and temperature.

Water is essential in the formation of soil. Water dissolves soluble materials and is used by plants and animals. It transports material from one part of the soil to another part and from one area to another area. These processes and chemical reactions in the soil are dependent to some extent on temperature. Temperature is important in controlling the type and quantity of vegetation, the amount and kind of organic matter, and the rate of decomposition of organic matter. Soils in DeKalb County formed under a thermic temperature regime. The soil temperature at a depth of 20 inches averages about 63° to 65° F annually.

The climate of DeKalb County is warm and moist and is probably similar to the climate that existed as the soils were forming. The relatively high rainfall and warm temperature contribute to rapid soil formation. Rainfall and temperature are uniform throughout the survey area.

time

The length of time that the soil-forming factors act on the parent material determines to a large degree the characteristics of the soil. Soils in DeKalb County are generally classified as either young or mature. The young soils do not have pedogenic horizons; they show an irregular decrease in content of carbon with an increase in depth. Mature soils are in equilibrium with the environment. They have readily recognizable pedogenic horizons, and they show a regular decrease in content of carbon as depth increases.

Cartecay and Toccoa soils are on flood plains that annually receive new sediment from floodwater. These soils are stratified and are not old enough to have a zone of illuviation. Appling, Cecil, Gwinnett, Hiwassee, Madison, and Pacolet soils commonly are on broad, stable, upland landscapes where the soil-forming processes have been active for thousands of years. These soils have a clayey subsoil and a highly developed zone of illuviation.

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glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat

excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series

because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-74 at Atlanta, Ga.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	52.3	33.6	42.6	72	8	44	4.78	2.91	6.46	8	.5
February---	55.2	35.1	45.2	75	12	63	4.62	2.78	6.26	8	.6
March------	62.5	41.5	52.1	81	21	159	5.60	3.77	7.25	8	.2
April------	72.7	50.8	61.8	87	32	354	4.50	2.98	5.88	7	0
May--------	79.9	58.8	69.4	91	41	601	3.70	1.68	5.33	6	0
June-------	85.5	65.9	75.7	97	52	771	3.44	1.96	4.63	7	0
July-------	87.6	69.1	78.4	96	60	880	4.92	2.78	6.65	9	0
August-----	87.4	68.7	78.1	95	60	871	3.32	1.42	4.86	6	0
September--	82.1	63.5	72.8	94	47	684	3.11	1.33	4.55	5	0
October----	72.8	52.1	62.5	88	32	388	2.37	0.40	3.88	4	0
November---	62.2	41.3	51.8	81	22	105	3.19	1.78	4.34	5	0
December---	54.0	35.4	44.7	73	13	59	4.64	2.44	6.43	7	.3
Yearly:											
Average--	71.2	51.3	61.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	6	---	---	---	---	---	---
Total----	---	---	---	---	---	4,979	48.19	42.07	54.09	80	1.6

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-74 at Atlanta, Ga.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 22	April 4	April 8
2 years in 10 later than--	March 12	March 26	April 3
5 years in 10 later than--	February 20	March 10	March 24
First freezing temperature in fall:			
1 year in 10 earlier than--	November 14	November 6	October 26
2 years in 10 earlier than--	November 21	November 11	October 31
5 years in 10 earlier than--	December 5	November 20	November 8

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-74 at Atlanta, Ga.]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	248	221	208
8 years in 10	261	232	215
5 years in 10	287	255	228
2 years in 10	313	277	241
1 year in 10	326	289	247

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AkA	Altavista fine sandy loam, 0 to 2 percent slopes	142	0.1
AkB	Altavista fine sandy loam, 2 to 6 percent slopes	752	0.4
AmB	Appling sandy loam, 2 to 6 percent slopes	624	0.4
AmC	Appling sandy loam, 6 to 10 percent slopes	712	0.4
AuC	Appling-Urban land complex, 2 to 10 percent slopes	960	0.6
AvD	Ashlar sandy loam, very rocky, 6 to 15 percent slopes	1,833	1.1
AvF	Ashlar sandy loam, very rocky, 15 to 45 percent slopes	1,368	0.8
AwC	Ashlar-Wedowee complex, 2 to 10 percent slopes	4,782	2.8
AwE	Ashlar-Wedowee complex, 10 to 25 percent slopes	4,736	2.8
Ca	Cartecay silt loam, frequently flooded	6,787	3.9
CeB	Cecil sandy loam, 2 to 6 percent slopes	2,601	1.5
CeC	Cecil sandy loam, 6 to 10 percent slopes	2,247	1.3
CeD	Cecil sandy loam, 10 to 15 percent slopes	369	0.2
CfC2	Cecil sandy clay loam, 2 to 10 percent slopes, eroded	330	0.2
CuC	Cecil-Urban land complex, 2 to 10 percent slopes	29,654	17.2
CvF	Chestatee stony sandy loam, 15 to 45 percent slopes	1,531	0.9
GeB	Gwinnett sandy loam, 2 to 6 percent slopes	1,163	0.7
GeC	Gwinnett sandy loam, 6 to 10 percent slopes	3,276	1.9
GeD	Gwinnett sandy loam, 10 to 15 percent slopes	1,854	1.1
GeE	Gwinnett sandy loam, 15 to 30 percent slopes	1,068	0.6
GwC2	Gwinnett sandy clay loam, 2 to 10 percent slopes, eroded	1,545	0.9
GwD2	Gwinnett sandy clay loam, 10 to 15 percent slopes, eroded	1,072	0.6
GwE2	Gwinnett sandy clay loam, 15 to 25 percent slopes, eroded	345	0.2
HsB	Hiwassee sandy loam, 2 to 6 percent slopes	394	0.2
HsC	Hiwassee sandy loam, 6 to 10 percent slopes	527	0.3
HtC2	Hiwassee clay loam, 6 to 10 percent slopes, eroded	259	0.2
IrC	Iredell fine sandy loam, 2 to 10 percent slopes	647	0.4
MdB	Madison sandy loam, 2 to 6 percent slopes	912	0.5
MdC	Madison sandy loam, 6 to 10 percent slopes	2,274	1.3
MdD	Madison sandy loam, 10 to 15 percent slopes	1,679	1.0
MdE	Madison sandy loam, 15 to 30 percent slopes	2,468	1.4
MfC2	Madison sandy clay loam, 2 to 10 percent slopes, eroded	1,631	0.9
MfD2	Madison sandy clay loam, 10 to 15 percent slopes, eroded	1,358	0.8
MfE2	Madison sandy clay loam, 15 to 25 percent slopes, eroded	702	0.4
MvD2	Musella clay loam, 6 to 15 percent slopes, eroded	327	0.2
MvE2	Musella clay loam, 15 to 25 percent slopes, eroded	129	0.1
MwD	Musella stony sandy clay loam, 6 to 15 percent slopes	277	0.2
MwF	Musella stony sandy clay loam, 15 to 45 percent slopes	281	0.2
PfC	Pacolet sandy loam, 2 to 10 percent slopes	9,958	5.8
PfD	Pacolet sandy loam, 10 to 15 percent slopes	5,608	3.3
PfE	Pacolet sandy loam, 15 to 30 percent slopes	5,903	3.4
PgC2	Pacolet sandy clay loam, 2 to 10 percent slopes, eroded	1,008	0.6
PgD2	Pacolet sandy clay loam, 10 to 15 percent slopes, eroded	932	0.5
PuE	Pacolet-Urban land complex, 10 to 25 percent slopes	25,685	14.9
Pm	Pits, quarries	545	0.3
Rx	Rock outcrop	2,017	1.2
SgD	Sweetapple-Grover complex, 6 to 15 percent slopes	338	0.2
SgF	Sweetapple-Grover complex, 15 to 45 percent slopes	674	0.4
Tf	Toccoa sandy loam, frequently flooded	5,046	2.9
To	Toccoa sandy loam, high	838	0.5
Ub	Udorthents, 2 to 10 percent slopes	526	0.3
Ud	Urban land	22,736	13.2
WeB	Wedowee sandy loam, 2 to 6 percent slopes	763	0.4
WeC	Wedowee sandy loam, 6 to 10 percent slopes	1,463	0.9
WeE	Wedowee sandy loam, 10 to 25 percent slopes	1,464	0.9
Wf	Wehadkee silt loam, frequently flooded	711	0.4
WkC	Wilkes sandy loam, 2 to 10 percent slopes	617	0.4
WkE	Wilkes sandy loam, 10 to 25 percent slopes	594	0.3
WmD	Wilkes stony sandy loam, 6 to 15 percent slopes	599	0.3
WmF	Wilkes stony sandy loam, 15 to 45 percent slopes	202	0.1
WoB	Worsham sandy loam, 2 to 6 percent slopes	125	0.1
	Total	171,968	100.0

TABLE 5.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AkA Altavista	Severe: floods.	Slight	Moderate: wetness, floods.	Slight	Moderate: wetness floods.
AkB Altavista	Moderate: wetness.	Slight	Moderate: slope, wetness.	Slight	Moderate: wetness.
AmB Appling	Slight	Slight	Moderate: slope.	Slight	Slight.
AmC Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
AuC:* Appling	Slight	Slight	Severe: slope.	Slight	Slight.
Urban land.					
AvD Ashlar	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: depth to rock.
AvF Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AwC:* Ashlar	Slight	Slight	Severe: slope.	Slight	Moderate: depth to rock.
Wedowee	Slight	Slight	Severe: slope.	Slight	Slight.
AwE:* Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ca Cartecay	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: floods, wetness.	Moderate: wetness.	Severe: floods, wetness.
CeB Cecil	Slight	Slight	Moderate: slope.	Slight	Slight.
CeC, CeD Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CfC2 Cecil	Slight	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Slight.
CuC:* Cecil	Slight	Slight	Severe: slope.	Slight	Slight.
Urban land.					
CvF Chestatee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GeB---- Gwinnett	Slight	Slight	Moderate: slope.	Slight	Slight.
GeC, GeD---- Gwinnett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
GeE---- Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GwC2---- Gwinnett	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
GwD2---- Gwinnett	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope, too clayey.
GwE2---- Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HsB---- Hiwassee	Slight	Slight	Moderate: slope.	Slight	Slight.
HsC, HtC2---- Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
IrC---- Iredell	Severe: wetness.	Moderate: wetness.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness.
MdB---- Madison	Slight	Slight	Moderate: slope.	Slight	Slight.
MdC, MdD---- Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
MdE---- Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MfC2---- Madison	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
MfD2---- Madison	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope, too clayey.
MfE2---- Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MvD2---- Musella	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
MvE2---- Musella	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.
MwD---- Musella	Severe: too clayey, large stones.	Moderate: too clayey, large stones.	Severe: slope.	Severe: too clayey, large stones.	Moderate: too clayey, large stones.
MwF---- Musella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PfC---- Pacolet	Slight	Slight	Severe: slope.	Slight	Slight.
PfD---- Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PfE---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PgC2---------- Pacolet	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
PgD2---------- Pacolet	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
PuE:* Pacolet----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land.					
Pw.* Pits					
Rx.* Rock outcrop					
SgD:* Sweetapple----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Grover----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
SgF:* Sweetapple----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Grover----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tf---------- Toccoa	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
To---------- Toccoa	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
Ub.* Udorthents					
Ud.* Urban land					
WeB---------- Wedowee	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
WeC---------- Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WeE---------- Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wf---------- Wehadkee	Severe: floods, wetness.	Severe: wetness.	Severe: floods.	Severe: wetness.	Severe: floods, wetness.
WkC---------- Wilkes	Moderate: percs slowly.	Slight----------	Severe: slope.	Slight----------	Slight.
WkE---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WmD---------- Wilkes	Moderate: slope, percs slowly, small stones.	Moderate: slope, percs slowly, small stones.	Severe: slope, small stones.	Slight----------	Severe: large stones.
WmF---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WoB---------- Worsham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AkA---------- Altavista	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, low strength.	Moderate: wetness, floods.
AkB---------- Altavista	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
AmB---------- Appling	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
AmC---------- Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
AuC:* Appling----------	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
AvD---------- Ashlar	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: thin layer, slope.
AvF---------- Ashlar	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
AwC:* Ashlar----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock, slope.	Moderate: depth to rock.	Moderate: thin layer.
Wedowee----------	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
AwE:* Ashlar----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Wedowee----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ca---------- Cartecay	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
CeB---------- Cecil	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
CeC, CeD---------- Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
CfC2---------- Cecil	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CuC:*						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
CvF: Chestatee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GeB: Gwinnett	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
GeC, GeD: Gwinnett	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
GeE: Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GwC2: Gwinnett	Moderate: too clayey. depth to rock.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
GwD2: Gwinnett	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
GwE2: Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HsB: Hiwassee	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
HsC, HtC2: Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
IrC: Iredell	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.	Moderate: wetness.
MdB: Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
MdC, MdD: Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MdE: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MfC2: Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
MfD2: Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MfE2: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MvD2: Musella	Moderate: depth to rock, too clayey, slope.	Moderate: depth to rock, slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, thin layer.
MvE2: Musella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MwD---------- Musella	Moderate: depth to rock, too clayey, large stones.	Moderate: depth to rock, large stones, slope.	Moderate: depth to rock, large stones.	Severe: slope.	Moderate: depth to rock, large stones, slope.	Moderate: thin layer, slope, large stones.
MwF---------- Musella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PfC---------- Pacolet	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
PfD---------- Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PfE---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PgC2---------- Pacolet	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
PgD2---------- Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PuE:* Pacolet----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
Pw.* Pits						
Rx.* Rock outcrop						
SgD:* Sweetapple-------	Moderate: depth to rock.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: thin layer, slope.
Grover----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
SgF:* Sweetapple-------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Grover----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tf---------- Toccoa	Moderate: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
To---------- Toccoa	Moderate: wetness.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Slight.
Ub.* Udorthents						
Ud.* Urban land						
WeB---------- Wedowee	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WeC---------- Wedowee	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
WeE---------- Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wf---------- Wehadkee	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
WkC---------- Wilkes	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock.	Moderate: slope.	Slight---------	Moderate: thin layer.
WkE---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WmD---------- Wilkes	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: thin layer, slope, large stones.
WmF---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WoB---------- Worsham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AkA Altavista	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods,	Good.
AkB Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Good.
AmB Appling	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
AmC Appling	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
AuC*: Appling	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Urban land.					
AvD Ashlar	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim.
AvF Ashlar	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, thin layer, area reclaim.
AwC:* Ashlar	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim.
Wedowee	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
AwE:* Ashlar	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, thin layer. area reclaim.
Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ca Cartecay	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Good.
CeB Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight	Fair: too clayey.
CeC, CeD Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, seepage.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CfC2---------- Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight----------	Fair: too clayey.
CuC*: Cecil----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight----------	Fair: too clayey.
Urban land.					
CvF---------- Chestatee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
GeB---------- Gwinnett	Slight----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
GeC, GeD---------- Gwinnett	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
GeE---------- Gwinnett	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
GwC2---------- Gwinnett	Slight----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
GwD2---------- Gwinnett	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
GwE2---------- Gwinnett	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
HsB---------- Hiwassee	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
HsC, HtC2---------- Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey. slope.
IrC---------- Iredell	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: thin layer.
MdB---------- Madison	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
MdC, MdD---------- Madison	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
MdE---------- Madison	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
MfC2---------- Madison	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
MfD2---------- Madison	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MfE2---------- Madison	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
MvD2---------- Musella	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
MvE2---------- Musella	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer.
MwD---------- Musella	Severe: depth to rock, large stones.	Severe: depth to rock, slope.	Severe: depth to rock, large stones.	Moderate: slope.	Poor: thin layer, large stones.
MwF---------- Musella	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: thin layer, large stones.
PfC---------- Pacolet	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey. slope.
PfD---------- Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
PfE---------- Pacolet	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
PgC2---------- Pacolet	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
PgD2---------- Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
PuE:* Pacolet----------	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
Urban land.					
Pw.* Pits					
Rx.* Rock outcrop					
SgD:* Sweetapple---------	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: slope.
Grover----------	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
SgF:* Sweetapple---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
Grover----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Tf---------- Toccoa	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage.	Good.
To---------- Toccoa	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
Ub.* Udorthents					
Ud.* Urban land					
WeB---------- Wedowee	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
WeC---------- Wedowee	Moderate: percs slowly, slope.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
WeE---------- Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wf---------- Wehadkee	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness.
WkC---------- Wilkes	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim.
WkE---------- Wilkes	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: thin layer, area reclaim, slope.
WmD---------- Wilkes	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim, large stones.
WmF---------- Wilkes	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: thin layer, slope, large stones.
WoB---------- Worsham	Severe: percs slowly, wetness.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AkA, AkB---------- Altavista	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
AmB, AmC---------- Appling	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
AuC:* Appling----------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Urban land.				
AvD---------- Ashlar	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
AvF---------- Ashlar	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
AwC:* Ashlar----------	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
Wedowee----------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
AwE:* Ashlar----------	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Wedowee----------	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Ca---------- Cartecay	Fair: wetness.	Poor: excess fines.	Unsuited: excess fines.	Good.
CeB, CeC, CeD, CfC2--- Cecil	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Poor: thin layer.
CuC:* Cecil----------	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Poor: thin layer.
Urban land.				
CvF---------- Chestatee	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones, slope.
GeB, GeC, GeD, GeE, GwC2, GwD2, GwE2----- Gwinnett	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
HsB, HsC, HtC2-------- Hiwassee	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
IrC---------- Iredell	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MdB, MdC, MdD---------- Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MdE---------- Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
MfC2, MfD2---------- Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MfE2---------- Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
MvD2, MvE2---------- Musella	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: thin layer.
MwD---------- Musella	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: thin layer, large stones.
MwF---------- Musella	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: thin layer, large stones.
PfC, PfD---------- Pacolet	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
PfE---------- Pacolet	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
PgC2, PgD2---------- Pacolet	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
PuE:* Pacolet----------	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
Urban land.				
Pw*. Pits				
Rx.* Rock outcrop				
SgD:* Sweetapple----------	Poor: thin layer, area reclaim.	Poor: excess fines.	Poor: excess fines.	Fair: slope, small stones, area reclaim.
Grover----------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
SgF:* Sweetapple----------	Poor: slope, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
SgF:* Grover	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Tf, To- Toccoa	Good	Poor: excess fines.	Unsuited: excess fines.	Good.
Ub.* Udorthents				
Ud.* Urban land				
WeB- Wedowee	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WeC- Wedowee	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WeE- Wedowee	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
Wf- Wehadkee	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
WkC- Wilkes	Fair: thin layer, area reclaim.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WkE- Wilkes	Fair: thin layer, slope, area reclaim.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
WmD- Wilkes	Fair: thin layer, area reclaim.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
WmF- Wilkes	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope, large stones.
WoB- Worsham	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AkA---------- Altavista	Moderate: seepage.	Moderate: thin layer, wetness.	Floods--------	Wetness, floods.	Not needed----	Favorable.
AkB---------- Altavista	Moderate: seepage.	Moderate: thin layer, wetness.	Favorable-----	Wetness-------	Favorable-----	Favorable.
AmB---------- Appling	Moderate: seepage.	Moderate: piping.	Not needed----	Favorable-----	Favorable-----	Favorable.
AmC---------- Appling	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
AuC:* Appling----------	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
Urban land.						
AvD, AvF---------- Ashlar	Depth to rock, seepage, slope.	Thin layer, seepage.	Not needed----	Droughty, rooting depth slope.	Depth to rock, rooting depth slope.	Droughty, rooting depth slope.
AwC:* Ashlar----------	Depth to rock, seepage.	Thin layer, seepage.	Not needed----	Droughty, rooting depth	Depth to rock, rooting depth	Droughty, rooting depth
Wedowee----------	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
AwE:* Ashlar----------	Depth to rock, seepage.	Thin layer, seepage.	Not needed----	Droughty, rooting depth slope.	Depth to rock, rooting depth slope.	Droughty, rooting depth slope.
Wedowee----------	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
Ca---------- Cartecay	Moderate: seepage.	Moderate: piping.	Floods--------	Floods, wetness.	Not needed----	Not needed.
CeB, CeC, CfC2---- Cecil	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
CeD---------- Cecil	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
CuC:* Cecil----------	Moderate: seepage.	Moderate: hard to pack.	Not needed----	Slope---------	Favorable-----	Favorable.
Urban land.						
CvF---------- Chestatee	Moderate: seepage, slope.	Moderate: piping, large stones.	Not needed----	Slope---------	Slope, large stones.	Slope, large stones.
GeB, GeC---------- Gwinnett	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GeD, GeE---------- Gwinnett	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
GwC2---------- Gwinnett	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
GwD2, GwE2-------- Gwinnett	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
HsB---------- Hiwassee	Moderate: seepage.	Moderate: piping.	Not needed----	Favorable-----	Favorable-----	Favorable.
HsC, HtC2--------- Hiwassee	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
IrC---------- Iredell	Slight---------	Moderate: hard to pack.	Percs slowly, slope.	Percs slowly, slope, wetness.	Percs slowly, wetness.	Percs slowly.
MdB, MdC, MfC2---- Madison	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
MdD, MdE, MfD2, MfE2---------- Madison	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
MvD2, MvE2-------- Musella	Severe: depth to rock, seepage.	Moderate: thin layer.	Not needed----	Rooting depth, slope.	Depth to rock, rooting depth slope.	Rooting depth, slope.
MwD, MwF---------- Musella	Severe: depth to rock, seepage, slope.	Moderate: thin layer, large stones.	Not needed----	Rooting depth, slope.	Depth to rock, rooting depth large stones.	Rooting depth, slope, large stones.
PfC, PgC2--------- Pacolet	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Favorable-----	Favorable.
PfD, PfE, PgD2---- Pacolet	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
PuE:* Pacolet----------	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
Urban land.						
Pw.* Pits						
Rx.* Rock outcrop						
SgD:* Sweetapple-------	Severe: seepage.	Severe: piping, seepage.	Not needed----	Slope---------	Slope---------	Slope.
Grover----------	Moderate: seepage.	Moderate: piping.	Not needed----	Slope---------	Slope---------	Slope.
SgF:* Sweetapple-------	Severe: seepage, slope.	Severe: piping, seepage.	Not needed----	Slope---------	Slope.	Slope.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
SgF:* Grover	Moderate: seepage.	Moderate: piping.	Not needed	Slope	Slope	Slope.
Tf Toccoa	Severe: seepage.	Severe: piping.	Floods	Floods	Not needed	Not needed.
To Toccoa	Severe: seepage.	Severe: piping.	Not needed	Favorable	Not needed	Not needed.
Ub.* Udorthents						
Ud.* Urban land						
WeB, WeC Wedowee	Moderate: seepage.	Moderate: piping.	Not needed	Slope	Favorable	Favorable.
WeE Wedowee	Moderate: seepage.	Moderate: piping.	Not needed	Slope	Slope	Slope.
Wf Wehadkee	Moderate: seepage.	Severe: wetness.	Floods	Wetness, floods.	Not needed	Wetness.
WkC, WkE, WmD, WmF Wilkes	Moderate: depth to rock, seepage.	Moderate: thin layer.	Not needed	Slope	Depth to rock, slope.	Slope.
WoB Worsham	Slight	Severe: wetness.	Percs slowly	Wetness	Not needed	Percs slowly, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AkA, AkB---------- Altavista	0-13	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0	95-100	95-100	65-95	35-60	<23	NP-7
	13-53	Clay loam, sandy clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	60-95	50-75	20-45	5-26
	53-88	Variable--------	---	---	0	---	---	---	---	---	---
AmB, AmC---------- Appling	0-14	Sandy loam------	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	14-55	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	55-68	Variable--------	---	---	---	---	---	---	---	---	---
AuC:* Appling----------	0-14	Sandy loam------	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	14-55	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	55-68	Variable--------	---	---	---	---	---	---	---	---	---
Urban land.											
AvD, AvF---------- Ashlar	0-8	Sandy loam------	SC, SM	A-2, A-4, A-1	0-2	70-95	65-95	40-80	20-50	12-21	NP-4
	8-24	Sandy loam, fine sandy loam, gravelly sandy loam.	SC, SM, GM, GC	A-1, A-2, A-4	2-8	55-95	50-90	30-75	15-50	14-23	NP-6
	24-31	Variable--------	---	---	---	---	---	---	---	---	---
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
AwC,* AwE:* Ashlar----------	0-8	Sandy loam------	SC, SM	A-2, A-4, A-1	0-2	70-95	65-95	40-80	20-50	12-21	NP-4
	8-24	Sandy loam, fine sandy loam, gravelly sandy loam.	SC, SM, GM, GC	A-1, A-2, A-4	2-8	55-95	50-90	30-75	15-50	14-23	NP-6
	24-31	Variable--------	---	---	---	---	---	---	---	---	---
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wedowee----------	0-11	Sandy loam------	SM, SM-SC	A-4	0	95-100	90-100	60-85	30-50	<30	NP-6
	11-15	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	15-39	Sandy clay, clay loam, clay.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	65-97	45-70	30-58	10-25
	39-75	Variable--------	---	---	---	---	---	---	---	---	---
Ca---------- Cartecay	0-8	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	98-100	95-100	90-100	51-95	<40	NP-15
	8-60	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC	A-2, A-4	0	90-100	75-100	60-85	25-50	<30	NP-10
CeB, CeC, CeD------ Cecil	0-6	Sandy loam------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	6-51	Clay------------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	51-62	Variable--------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CfC2---------- Cecil	0-5	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0	74-100	72-100	68-95	38-81	21-35	3-15
	5-52	Clay----------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	52-61	Variable--------	---	---	---	---	---	---	---	---	---
CuC:* Cecil----------	0-6	Sandy loam------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	6-51	Clay----------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	51-62	Variable--------	---	---	---	---	---	---	---	---	---
Urban land.											
CvF---------- Chestatee	0-5	Stony sandy loam	SM	A-2	10-22	80-98	66-85	50-75	15-30	<30	NP-4
	5-9	Stony sandy clay loam, stony clay loam, bouldery sandy clay loam.	SM, SC, SM-SC	A-2, A-4	10-30	75-95	60-90	55-80	25-45	20-35	4-10
	9-35	Bouldery clay, bouldery clay loam, bouldery sandy clay.	SC, CL	A-4, A-6, A-7	10-35	75-95	60-90	60-80	45-75	25-45	8-25
	35-62	Variable--------	---	---	---	---	---	---	---	---	---
GeB, GeC, GeD, GeE- Gwinnett	0-7	Sandy loam------	SM, SC, SM-SC	A-2, A-4, A-6	0-3	95-100	85-100	65-90	30-50	<32	NP-15
	7-31	Clay, sandy clay	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	31-62	Variable--------	---	---	---	---	---	---	---	---	---
GwC2, GwD2, GwE2--- Gwinnett	0-5	Sandy clay loam	SM, SC, SM-SC	A-2, A-4, A-6	0-3	95-100	85-100	65-90	30-50	<32	NP-15
	5-30	Clay, sandy clay	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	30-60	Variable--------	---	---	---	---	---	---	---	---	---
HsB, HsC---------- Hiwassee	0-7	Sandy loam------	SM, SM-SC	A-4, A-2	0-2	95-100	90-100	70-95	30-50	<35	NP-7
	7-52	Clay, silty clay, clay loam.	CL, ML, MH	A-7-5, A-7-6, A-6	0-2	95-100	95-100	80-100	70-95	36-52	12-20
	52-63	Variable--------	---	---	---	---	---	---	---	---	---
HtC2---------- Hiwassee	0-6	Clay loam-------	CL, ML, CL-ML	A-7-6, A-6, A-4	0-2	95-100	95-100	90-100	50-85	25-50	5-23
	6-46	Clay, silty clay, clay loam.	CL, ML, MH	A-7-5, A-7-6, A-6	0-2	95-100	95-100	80-100	70-95	36-52	12-20
	46-62	Variable--------	---	---	---	---	---	---	---	---	---
IrC---------- Iredell	0-10	Fine sandy loam	SM	A-2-4, A-4	0-1	90-98	80-90	65-80	30-50	<35	NP-9
	10-27	Clay----------	CH	A-7	0	99-100	85-100	80-100	65-95	60-115	30-85
	27-44	Variable--------	---	---	---	---	---	---	---	---	---
	44-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MdB, MdC, MdD, MdE- Madison	0-6	Sandy loam------	SM	A-2, A-4	0-3	85-100	80-100	60-90	26-49	<35	NP-8
	6-28	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	28-62	Variable--------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MfC2, MfD2, MfE2--- Madison	0-5	Sandy clay loam	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	5-28	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	28-62	Variable--------	---	---	---	---	---	---	---	---	---
MvD2, MvE2--------- Musella	0-4	Clay loam-------	SM, SC, SM-SC, ML	A-4	0-5	95-100	80-95	60-80	40-65	<37	NP-10
	4-16	Gravelly clay loam, gravelly clay, clay loam.	ML, CL, SM, SC	A-6, A-7	10-20	75-90	60-85	55-80	43-64	34-48	11-20
	16-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MwD, MwF---------- Musella	0-5	Stony sandy clay loam.	SM, SC, SM-SC	A-2, A-4	5-20	75-90	60-90	50-70	30-45	<37	NP-10
	5-19	Gravelly clay loam, gravelly clay.	ML, CL, SM, SC	A-6, A-7	10-20	75-90	60-85	55-80	43-64	34-48	11-20
	19-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
PfC, PfD, PfE------ Pacolet	0-5	Sandy loam------	SM, SM-SC	A-2	0-2	85-100	80-100	60-80	20-35	<36	NP-10
	5-36	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	36-66	Variable--------	---	---	---	---	---	---	---	---	---
PgC2, PgD2--------- Pacolet	0-5	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	26-61	Variable--------	---	---	---	---	---	---	---	---	---
PuE:* Pacolet----------	0-5	Sandy loam------	SM, SM-SC	A-2	0-2	85-100	80-100	60-80	20-35	<36	NP-10
	5-36	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	36-66	Variable--------	---	---	---	---	---	---	---	---	---
Urban land.											
Pw.* Pits											
Rx.* Rock outcrop											
SgD,* SgF:* Sweetapple--------	0-8	Fine sandy loam	SM, SM-SC	A-2, A-4	0-2	80-100	75-95	50-80	30-40	<30	NP-7
	8-26	Gravelly fine sandy loam, gravelly sandy loam, sandy loam.	SM	A-2	0-15	80-100	75-95	50-70	20-30	---	NP
	26-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Grover------------	0-9	Fine sandy loam	SM, SM-SC, SC	A-4	0-5	95-100	90-100	50-75	36-50	<30	NP-10
	9-34	Sandy clay loam, clay loam.	SC, CL	A-6, A-7	0-5	95-100	90-100	70-85	40-70	35-50	12-25
	34-62	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Tf---------- Toccoa	0-8 8-60	Sandy loam------ Sandy loam, loam	SM, ML SM, ML	A-2, A-4 A-2, A-4	0 0	98-100 95-100	95-100 90-100	85-100 60-100	25-60 30-55	<30 <30	NP-4 NP-4
To---------- Toccoa	0-12 12-62	Sandy loam------ Sandy loam, loam	SM, ML SM, ML	A-2, A-4 A-2, A-4	0 0	98-100 95-100	95-100 90-100	85-100 60-100	25-60 30-55	<30 <30	NP-4 NP-4
Ub.* Udorthents											
Ud.* Urban land											
WeB, WeC, WeE------ Wedowee	0-11 11-15 15-39 39-75	Sandy loam------ Loam, sandy clay loam. Sandy clay, clay loam, clay. Variable--------	SM, SM-SC SM, SC, CL, ML SC, ML, CL, SM ---	A-4 A-4, A-6 A-4, A-6, A-7 ---	0 0 0 ---	95-100 90-100 95-100 ---	90-100 90-100 95-100 ---	60-85 80-97 65-97 ---	30-50 40-75 45-70 ---	<30 <32 30-58 ---	NP-6 NP-15 10-25 ---
Wf---------- Wehadkee	0-8 8-62	Silt loam------- Loam, sandy clay loam, clay loam.	CL, MH, ML, CH ML, CL	A-6, A-7 A-6, A-7	0 0	100 100	98-100 99-100	85-100 90-100	51-95 51-85	25-52 30-45	11-22 11-20
WkC, WkE---------- Wilkes	0-7 7-16 16-28 28-40 40	Sandy loam------ Clay loam, clay, sandy clay loam. Variable-------- Weathered bedrock. Unweathered bedrock.	ML, SM, SM-SC CL, CH, MH --- --- ---	A-2, A-4 A-6, A-7 --- --- ---	0-10 0-10 --- --- ---	90-100 80-100 --- --- ---	80-100 80-100 --- --- ---	60-92 75-95 --- --- ---	25-55 50-80 --- --- ---	<35 30-60 --- --- ---	NP-7 11-32 --- --- ---
WmD, WmF---------- Wilkes	0-12 12-19 19-48 48-60	Stony sandy loam. Clay loam, clay, sandy clay loam. Variable-------- Weathered bedrock.	SM, SM-SC CL, CH, MH --- ---	A-2, A-4, A-1-b A-6, A-7 --- ---	25-35 0-10 --- ---	70-80 80-100 --- ---	60-75 80-100 --- ---	45-75 75-95 --- ---	20-49 50-80 --- ---	<20 30-60 --- ---	NP-7 11-32 --- ---
WoB---------- Worsham	0-12 12-60	Sandy loam------ Sandy clay loam, sandy clay, clay.	SM, SC, ML, CL SC, MH, CH	A-2, A-4 A-2, A-7	0-5 0-5	90-100 90-100	85-100 85-100	50-85 70-100	25-55 30-95	16-30 42-66	NP-9 22-40

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
AkA, AkB	0-13	2.0-6.0	0.12-0.20	4.5-6.0	Low	0.20	4
Altavista	13-53	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.24	
	53-88	---	---	---	---	---	
AmB, AmC	0-14	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.24	4
Appling	14-55	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	
	55-68	---	---	---	---	---	
AuC:*							
Appling	0-14	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.24	4
	14-55	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	
	55-68	---	---	---	---	---	
Urban land.							
AvD, AvF	0-8	2.0-6.0	0.08-0.15	4.5-6.0	Low	0.24	2
Ashlar	8-24	2.0-6.0	0.04-0.14	4.5-5.5	Low	0.43	
	24-31	---	---	---	---	---	
	31	---	---	---	---	---	
AwC,* AwE:*							
Ashlar	0-8	2.0-6.0	0.08-0.15	4.5-6.0	Low	0.24	2
	8-24	2.0-6.0	0.04-0.14	4.5-5.5	Low	0.43	
	24-31	---	---	---	---	---	
	31	---	---	---	---	---	
Wedowee	0-11	2.0-6.0	0.10-0.18	4.5-5.5	Low	0.24	2
	11-15	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.28	
	15-39	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	0.28	
	39-75	---	---	---	---	---	
Ca	0-8	2.0-6.0	0.12-0.16	5.1-6.5	Low	0.32	5
Cartecay	8-60	2.0-6.0	0.09-0.12	5.1-6.5	Low	0.24	
CeB, CeC, CeD	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	3
Cecil	6-51	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	0.28	
	51-62	---	---	---	---	---	
CfC2	0-5	0.6-2.0	0.13-0.15	4.5-6.0	Low	0.28	3
Cecil	5-52	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	0.28	
	52-61	---	---	---	---	---	
CuC:*							
Cecil	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	3
	6-51	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	0.28	
	51-62	---	---	---	---	---	
Urban land.							
CvF	0-5	2.0-6.0	0.06-0.12	4.5-5.5	Low	0.24	3
Chestatee	5-9	0.6-2.0	0.08-0.14	4.5-5.5	Low	0.32	
	9-35	0.6-2.0	0.08-0.12	4.5-5.5	Low	0.32	
	35-62	---	---	---	---	---	
GeB, GeC, GeD, GeE	0-7	0.6-2.0	0.11-0.17	5.1-6.5	Low	0.28	4
Gwinnett	7-31	0.6-2.0	0.11-0.16	5.1-6.5	Moderate	0.28	
	31-62	---	---	---	---	---	
GwC2, GwD2, GwE2-	0-5	0.6-2.0	0.11-0.17	5.1-6.5	Low	0.28	4
Gwinnett	5-30	0.6-2.0	0.11-0.16	5.1-6.5	Moderate	0.28	
	30-60	---	---	---	---	---	
HsB, HsC	0-7	0.6-2.0	0.10-0.14	4.5-6.5	Low	0.28	5
Hiwassee	7-52	0.6-2.0	0.12-0.15	4.5-6.5	Low	0.28	
	52-63	---	---	---	---	---	

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
HtC2---------- Hiwassee	0-6	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.28	4
	6-46	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.28	
	46-62	---	---	---	----------	----	
IrC---------- Iredell	0-10	2.0-6.0	0.12-0.15	5.6-7.3	Low----------	0.32	3
	10-27	0.06-0.2	0.16-0.22	6.1-7.3	Very high------	0.20	
	27-44	---	---	---	----------	----	
	44-65	---	---	---	----------	----	
MdB, MdC, MdD, MdE---------- Madison	0-6	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.32	4
	6-28	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32	
	28-62	---	---	---	----------	----	
MfC2, MfD2, MfE2- Madison	0-5	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.28	3
	5-28	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32	
	28-62	---	---	---	----------	----	
MvD2, MvE2------- Musella	0-4	0.6-2.0	0.17-0.19	5.1-6.5	Very low-------	0.32	2
	4-16	0.6-2.0	0.10-0.13	5.1-6.5	Low----------	0.32	
	16-60	---	---	---	----------	----	
MwD, MwF--------- Musella	0-5	0.6-2.0	0.12-0.14	5.6-6.5	Very low-------	0.28	2
	5-19	0.6-2.0	0.10-0.13	5.6-6.5	Low----------	0.32	
	19-65	---	---	---	----------	----	
PfC, PfD, PfE---- Pacolet	0-5	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	3
	5-36	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28	
	36-66	---	---	---	----------	----	
PgC2, PgD2------- Pacolet	0-5	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.24	2
	5-26	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28	
	26-61	---	---	---	----------	----	
PuE:* Pacolet---------	0-5	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	3
	5-36	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28	
	36-66	---	---	---	----------	----	
Urban land.							
Pw.* Pits							
Rx.* Rock outcrop							
SgD,* SgF:* Sweetapple------	0-8	2.0-6.0	0.12-0.16	4.5-6.0	Low----------	0.28	2
	8-26	2.0-6.0	0.10-0.14	4.5-6.5	Low----------	0.30	
	26-60	---	---	---	----------	----	
Grover----------	0-9	2.0-6.0	0.07-0.10	4.5-6.5	Low----------	0.28	3
	9-34	0.6-2.0	0.12-0.14	4.5-5.5	Low----------	0.32	
	34-62	---	---	---	----------	----	
Tf---------- Toccoa	0-8	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.10	4
	8-60	2.0-6.0	0.06-0.12	5.1-6.5	Low----------	0.10	
To---------- Toccoa	0-12	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.10	4
	12-62	2.0-6.0	0.06-0.12	5.1-6.5	Low----------	0.10	
Ub.* Udorthents							
Ud.* Urban land							

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
WeB, WeC, WeE----	0-11	2.0-6.0	0.10-0.18	4.5-5.5	Low----------	0.24	2
Wedowee	11-15	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.28	
	15-39	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-------	0.28	
	39-75	---	---	---	----------	----	
Wf----------	0-8	2.0-6.0	0.14-0.18	4.5-6.5	Low----------	0.24	5
Wehadkee	8-62	0.6-2.0	0.16-0.20	4.5-6.5	Low----------	0.32	
WkC, WkE---------	0-7	2.0-6.0	0.11-0.15	5.1-6.5	Low----------	0.28	2
Wilkes	7-16	0.2-0.6	0.15-0.20	6.1-7.8	Moderate-------	0.32	
	16-28	---	---	---	----------	----	
	28-40	---	---	---	----------	----	
	40	---	---	---	----------	----	
WmD, WmF---------	0-12	2.0-6.0	0.10-0.14	5.1-6.5	Low----------	0.24	2
Wilkes	12-19	0.2-0.6	0.15-0.20	6.1-7.8	Moderate-------	0.32	
	19-48	---	---	---	----------	----	
	48-60	---	---	---	----------	----	
WoB----------	0-12	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.43	2
Worsham	12-60	0.06-0.6	0.10-0.16	4.5-5.5	Moderate-------	0.43	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SOIL AND WATER FEATURES

[See text for definitions of terms such as "occasional," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AkA---------- Altavista	C	Occasional	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
AkB---------- Altavista	C	None--------	---	---	1.5-2.5	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
AmB, AmC---------- Appling	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
AuC:* Appling---------- Urban land.	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
AvD, AvF---------- Ashlar	B	None--------	---	---	>6.0	---	---	22-40	Hard	Low------	High.
AwC,* AwE:* Ashlar----------	B	None--------	---	---	>6.0	---	---	22-40	Hard	Low------	High.
Wedowee----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Ca---------- Cartecay	C	Frequent----	Brief-----	Dec-Mar	0.5-1.5	Apparent	Jan-Apr	>60	---	Low------	Moderate.
CeB, CeC, CeD, CfC2---------- Cecil	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CuC:* Cecil---------- Urban land.	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CvF---------- Chestatee	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
GeB, GeC, GeD, GeE, GwC2, GwD2, GwE2---------- Gwinnett	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
HsB, HsC, HtC2---- Hiwassee	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
IrC---------- Iredell	D	None--------	---	---	1.0-2.0	Perched	Nov-Mar	40-60	Soft	High-----	Low.
MdB, MdC, MdD, MdE, MfC2, MfD2, MfE2---------- Madison	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
MvD2, MvE2, MwD, MwF---------- Musella	B	None--------	---	---	>6.0	---	---	14-20	Soft	Moderate	Moderate.
PfC, PfD, PfE, PgC2, PgD2------- Pacolet	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
PuE:* Pacolet---------- Urban land.	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
Pw.* Pits											
Rx.* Rock outcrop											
SgD,* SgF:* Sweetapple	B	None	---	---	>6.0	---	---	24-50	Soft	Low	Moderate.
Grover	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Tf Toccoa	B	Frequent	Brief	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---	Low	Moderate.
To Toccoa	B	None	---	---	2.5-5.0	Apparant	Dec-Apr	>60	---	Low	Moderate.
Ub.* Udorthents											
Ud.* Urban land											
WeB, WeC, WeE Wedowee	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Wf Wehadkee	D	Frequent	Brief	Nov-Jun	0-2.5	Apparent	Nov-Jun	>60	---	High	Moderate.
WkC, WkE, WmD, WmF Wilkes	C	None	---	---	>6.0	---	---	40-80	Hard	Moderate	Moderate.
WoB Worsham	D	None	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution										Liquid limit	Plasticity index	Moisture density		Volume change		
			Percentage passing sieve--							Percentage smaller than--					Max. dry density	Optimum moisture	Total	Swell	Shrink
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm							
													Pct		Lb/ft^3	Pct	Pct	Pct	Pct
Iredell fine sandy loam:[1] (S74GA-089-001)																			
A1--------0 to 6	A-4 (00)	SM	99	98	98	97	96	81	38	21	11	8	--	NP	114	12	9.8	8.6	1.2
B2t------14 to 23	A-7-6(24)	CH	100	100	100	100	100	97	78	68	60	57	54	29	90	28	37.1	17.0	20.1
C--------27 to 44	A-4 (00)	SM	100	100	100	100	100	97	49	34	25	22	29	3	114	17	16.0	10.3	5.7
Wedowee sandy loam:[2] (S75GA-089-003)																			
Ap--------0 to 4	A-2-4(00)	SM	100	100	100	100	100	69	23	18	9	7	--	NP	118	10	5.3	4.6	0.7
B2t------16 to 27	A-7-5(17)	MH	100	100	100	100	100	87	71	67	62	59	57	22	90	29	10.5	3.0	7.5
C--------34 to 42	A-7-5(09)	MH	100	100	100	100	100	80	59	55	51	48	53	16	91	27	8.3	2.0	6.3
Wilkes sandy loam:[3] (S74GA-089-002)																			
Ap--------0 to 7	A-2-4(00)	SM	100	100	100	96	90	77	27	17	10	8	--	NP	114	13	6.7	5.9	0.8
B2t------10 to 16	A-6 (04)	CL	100	100	100	100	100	95	53	45	37	34	31	14	108	18	18.4	9.0	9.4
C1-------16 to 28	A-4 (00)	SM	100	100	100	100	100	97	42	30	24	21	--	NP	110	17	17.2	11.4	5.8
Cr-------28 to 40	A-2-4(00)	SM	100	100	100	100	100	93	23	11	7	6	--	NP	105	13	13.1	11.8	1.3

[1]Iredell fine sandy loam: 0.87 mile southwest of intersection of Interstate 285 and U.S. Highway 23, 0.64 mile west-southwest of intersection of Georgia Highway 160 and U.S. Highway 23.

[2]Wedowee sandy loam: 1/4 mile north-northeast of East Lithonia Baptist Church, 0.13 mile east of Georgia Highway 124, 0.81 mile north-northeast of Bruce School.

[3]Wilkes sandy loam: 0.63 mile southeast of Cedar Grove High School, 1.25 mile south-southwest of DeKalb Community College, 0.5 mile north-northwest of Forks Creek Baptist Church.

TABLE 14.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Ashlar	Coarse-loamy, mixed, thermic Typic Dystrochrepts
Cartecay	Coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chestatee	Clayey, kaolinitic, thermic Typic Hapludults
Grover	Fine-loamy, micaceous, thermic Typic Hapludults
Gwinnett	Clayey, kaolinitic, thermic Typic Rhodudults
Hiwassee	Clayey, kaolinitic, thermic Typic Rhodudults
*Iredell	Fine, montmorillonitic, thermic Typic Hapludalfs
Madison	Clayey, kaolinitic, thermic Typic Hapludults
Musella	Loamy, mixed, thermic, shallow Typic Rhodudults
Pacolet	Clayey, kaolinitic, thermic Typic Hapludults
Sweetapple	Coarse-loamy, micaceous, thermic Typic Dystrochrepts
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Wedowee	Clayey, kaolinitic, thermic Typic Hapludults
Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents
*Wilkes	Loamy, mixed, thermic, shallow Typic Hapludalfs
*Worsham	Clayey, mixed, thermic Typic Ochraquults

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